



IntelliFlow RM2



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SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any Carlisle system, read and understand all of the technical and safety literature for your products. This manual contains information that is important for you to know and understand. This information relates to USER SAFETY and PREVENTING EQUIPMENT PROBLEMS.

To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

WARNING

A WARNING! states information to alert you to a situation that might cause serious injury if instructions are not followed.

CAUTION

A CAUTION! states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

NOTE

A NOTE is information which is relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate equipment manuals to reconcile such differences.

WARNING

The user **MUST** read and be familiar with the Safety Section in this manual and the Ransburg safety literature therein identified.

This equipment is intended to be used by trained personnel **ONLY**.

This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to **ALL** local building and fire codes and ordinances as well as any applicable country safety standards, prior to installing, operating, and/or servicing this equipment.

WARNING

The hazards shown on the following pages may occur during the normal use of this equipment.

WARNING

Read the following warnings before using this equipment



AUTOMATIC EQUIPMENT Automatic equipment may start suddenly without warning.



KEEP EQUIPMENT GUARDS IN PLACE Do not operate the equipment if the safety devices have been removed.



KNOW WHERE AND HOW TO SHUT OFF THE EQUIPMENT IN CASE OF AN EMERGENCY



WEAR SAFETY GLASSES Failure to wear safety glasses with side shields could result in serious eye injury or blindness.



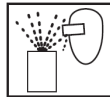
INSPECT THE EQUIPMENT DAILY Inspect the equipment for worn or broken parts on a daily basis. Do not operate the equipment if you are uncertain about its condition.



NEVER MODIFY THE EQUIPMENT Do not modify the equipment unless the manufacturer provides written approval.



NOISE HAZARD You may be injured by loud noise. Hearing protection may be required when using this equipment.



PROJECTILE HAZARD You may be injured by venting liquids or gases that are released under pressure, or flying debris.



PROP 65 WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.



READ THE MANUAL: Understand how to operate and service the equipment before performing these actions.



GROUND EQUIPMENT: The symbol denotes a connection point for ground.



ELECTRICAL SHOCK: Hazardous electrical energy is present inside the main control enclosure. Use caution if performing tasks within the cabinet.



PINCH HAZARD: Moving equipment could cause injury to fingers or hands.



LOCK-OUT-TAG-OUT: Before performing any maintenance on the equipment, lock-out the main electrical disconnect.



STATIC CHARGE Fluid may develop a static charge that must be dissipated through proper grounding of the equipment, objects to be sprayed and all other electrically conductive objects in the dispensing area. Improper grounding or sparks can cause a hazardous condition and result in fire, explosion or electric shock and other serious injury.



WEAR RESPIRATOR Toxic fumes can cause serious injury or death if inhaled. Wear a respirator as recommended by the fluid and solvent manufacturer's Safety Data Sheet.



TOXIC FLUID & FUMES Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, injected or swallowed. LEARN and KNOW the specific hazards or the fluids you are using.



FIRE AND EXPLOSION HAZARD Improper equipment grounding, poor ventilation, open flame or sparks can cause a hazardous condition and result in fire or explosion and serious injury.



MEDICAL ALERT Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor you suspect an injection injury.
- Show the doctor this medical information or the medical alert card provided with your airless spray equipment.
- Tell the doctor what kind of fluid you were spraying or dispensing.
- Refer to the Material Safety Data Sheet for specific information.



GET IMMEDIATE MEDICAL ATTENTION To prevent contact with the fluid, please note the following:

- Never point the gun/valve at anyone or any part of the body.
- Never put hand or fingers over the spray tip.
- Never attempt to stop or deflect fluid leaks with your hand, body, glove or rag.
- Always have the tip guard on the spray gun before spraying.
- Always ensure that the gun trigger safety operates before spraying.
- Always lock the gun trigger safety when you stop spraying.

It is the responsibility of the employer to provide this information to the operator of the equipment.

<p>AREA</p> <p>Tells where hazards may occur</p>	<p>HAZARD</p> <p>Tells what the hazard is</p>	<p>SAFEGUARDS</p> <p>Tells how to avoid the hazard</p>
<p>Toxic Substances</p>	<p>ISOCYANATE Conditions</p>	<p>Spraying or dispensing fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates. Workers exposed to isocyanates can develop a range of short and long-term health problems.</p> <p>Read and understand the fluid manufacturer’s warnings and Safety Data Sheet (SDS) to know specific hazards and precautions related to isocyanates.</p> <p>Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer’s application instructions and SDS.</p> <p>Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material which could cause off-gassing and offensive odors. Equipment must be carefully maintained and operated according to instructions in the manual.</p> <p>To prevent inhalation of isocyanate mists, vapors and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer’s SDS.</p> <p>Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.</p> <p>Hazard from exposure to isocyanates continues after spraying. Anyone without appropriate personal protective equipment must stay out of the work area during application and after application for the time period specified by the fluid manufacturer. Generally this time period is at least 24 hours.</p> <p>Warn others who may enter work area of hazard from exposure to isocyanates. Follow the recommendations of the fluid manufacturer and local regulatory authority. Posting a sign outside the work area is recommended.</p>

<p>AREA</p> <p>Tells where hazards may occur</p>	<p>HAZARD</p> <p>Tells what the hazard is</p>	<p>SAFEGUARDS</p> <p>Tells how to avoid the hazard</p>
<p>Toxic Substances</p>	<p>Chemical Hazard</p> <p>Certain materials may be harmful if inhaled, or if there is contact with the skin.</p>	<p>Follow the requirements of the Safety Data Sheet supplied by coating material manufacturer.</p> <p>Adequate exhaust must be provided to keep the air free of accumulations of toxic materials.</p> <p>Use a mask or respirator whenever there is a chance of inhaling sprayed materials. The mask must be compatible with the material being sprayed and its concentration. Equipment must be as prescribed by an industrial hygienist or safety expert, and be NIOSH approved.</p>
<p>Spray Area</p>	<p>Explosion Hazard – Incompatible Materials</p> <p>Halogenated hydrocarbon solvents for example: methylene chloride and 1,1,1, - Trichloroethane are not chemically compatible with the aluminum that might be used in many system components.</p> <p>The chemical reaction caused by these solvents reacting with aluminum can become violent and lead to an equipment explosion.</p>	<p>Spray applicators require that aluminum inlet fittings be replaced with stainless steel.</p> <p>Aluminum is widely used in other spray application equipment - such as material pumps, regulators, triggering valves, etc. Halogenated hydrocarbon solvents must never be used with aluminum equipment during spraying, flushing, or cleaning. Read the label or data sheet for the material you intend to spray. If in doubt as to whether or not a coating or cleaning material is compatible, contact your coating supplier. Any other type of solvent may be used with aluminum equipment.</p>

CAUTION

Do not operate the RM2 before reading this section.

Additional Safety Information

The RM2 has a main operator panel emergency stop (E-Stop) pushbutton. Included with the unit.

In the event of a safety fault, all operations for the RM2 will halt, all solenoid outputs will be turned off, and all pressure pilot signals will go to zero psi/BAR. Recovery from this state requires the user to reload material to reset all solenoids, etc. before resuming operation.

WARNING

Do not contact, disconnect, or other manipulation of electrical connections or devices while the system is under power. The main disconnect on the right side of the controller can be locked out, and proper Lockout - Tagout (LOTO) procedures should be used for any electrical work internal to the controller. If this is not possible for the purpose of diagnosis and troubleshooting under working conditions, then only qualified electrical personnel should perform the work.

NOTE

During initial commissioning of the equipment, and at periodic times throughout the life of the equipment, all fluid fittings should be visually inspected for leaks. Periodically, all pieces of this equipment should be visually inspected for signs of obvious degradation due to chemicals or other conditions that may be present in the environment where the equipment is installed.

WARNING

Local regulations may require fire-suppression equipment to be installed where the equipment is operated.

WARNING

To avoid possible chemical spillage when no personnel are on site, air and fluid supplies for the equipment should be

Optionally, some sensors, switches, or other ancillary equipment, connected to this equipment may be located in the presence of flammable gases and vapors. Any such equipment will be connected through the use of intrinsic-safe or Zener barriers and will be classified as a 'simple apparatus' or be themselves approved to be used in such areas.

Product Description / Object of Declaration:	RM2
Notified bodies details and role:	TUV SUD America Inc 141 14th St NW New Brighton MN 55112 USA EMC Testing
Certificates used in assessment if applicable:	
This Declaration of conformity / incorporation is issued under the sole responsibility of the manufacturer:	Carlisle Fluid Technologies 7166 4th St. N. Oakdale, MN 55128. USA
Representative authorised to compile the technical file	Sales and Marketing Director. CFT UK Ltd 1 Avenue de Lattre de Tassigny 94736 Nogent, Cedex. France


EU Declaration of Conformity **CE**

The object of the declaration described is in conformity with relevant Union harmonisation legislation regulations and fulfils essential safety requirements set out in Annex I

EMC Directive 2014/30/EU
 Low Voltage Directive 2014/35/EU
 RoHS Directive 2011/65/EU

by complying with the following statutory documents and harmonized standards:
 EN 60204-1:2018 Safety of Machinery. Electrical equipment of machines
 EN 60079-11:2012 Explosive atmospheres. Equipment protection by intrinsic safety"I"
 EN 61000-6-2:2005/AC:2005 Electromagnetic compatability (EMC) Generic Standard– Immunity for industrial environments
 EN 61000-6-4:2007+A1:2011 Electromagnetic compatability (EMC) Generic standard. Emission standard for industrial environments
 EN 61000-3-2:2014 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
 EN 61000-3-3:2013 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection

Providing all conditions of safe use / installation stated within the product manuals have been complied with and also installed in accordance with any applicable local codes of practice.

Signed for and on behalf of Carlisle Fluid Technologies UK Ltd.		F. A. Sutter 21/2/22	Executive President: Engineering and Operations, Scottsdale, BK, 85254. USA
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INTRODUCTION

The RM2 system is designed to accurately mix most two component (2K) and one component (1K) paints. It will supply any low-pressure manual or automatic spray gun and can easily handle very low flow rates or high ratio materials (greater than 20:1). The system uses real-time metering to accurately dispense and mix the resin and hardener on-ratio regardless of varying flow rate as seen in real world paint applications such as feathering or rapid triggering with manual guns.

The system is easily set up and operated with a 10" touch screen. Access to system parameters and usage data is restricted via password protection.

RM2 systems are configurable with many options and accessories:

- Up to 7 paint colors
- One hardener flow sensor
- Gun flush boxes
- Pedestal Stand
- Stack light (Included)
- Atomizing air cut-off (Included)
- 2nd gun capability (Included)

See section [14.0 in this manual for information](#) on accessory equipment.

FEATURES

The RM2 System has unique features that provide superior benefits:

Continuous Flow—The mix manifold is designed to optimize mix quality and minimize internal volume by receiving Resin (Component A) and Hardener (Component B) continuously.

Accurate Dispensing—Control and positioning of the B metering pump is precise. An electronically controlled stepper motor with integral linear actuator allow for dispense from 2cc to 600cc per minute, and ratios from 1:1 to 100:1 depending on the pump size chosen. Ratio tolerance down to 1% is possible.

Ease of Use—The touchscreen user interface is easy to learn and efficient to use. It provides control of the system with few actions, along with real-time data and in-depth troubleshooting when alarms occur.

Easily Configurable— Use up to seven different paint resins and up to two spray guns. Flush boxes, atomizing air control, and other options and accessories can be added at any time.

Programmable Flushing— Set unique flushing options specific to material needs.

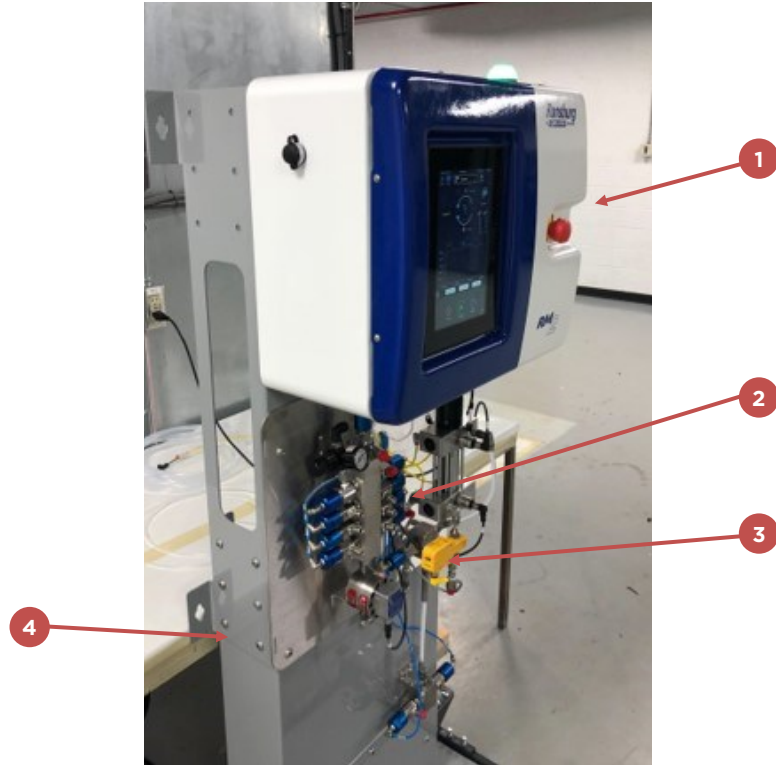
Mounting Options—The system can be mounted to a wall and plumbed into an existing workspace, or it can be bolted to the floor with an available pedestal stand.

Alarm Warnings—The alarm system warns the user of system errors and suggests possible solutions. Help screens provide troubleshooting information to remedy system alarms.

Modular Design—Sub-assemblies are easily and quickly removed for maintenance and repair.

SYSTEM COMPONENTS

- 1. Control Panel
- 2. Fluid Control Module
- 3. Mix Manifold
- 4. Pedestal (Optional)



Control Panel

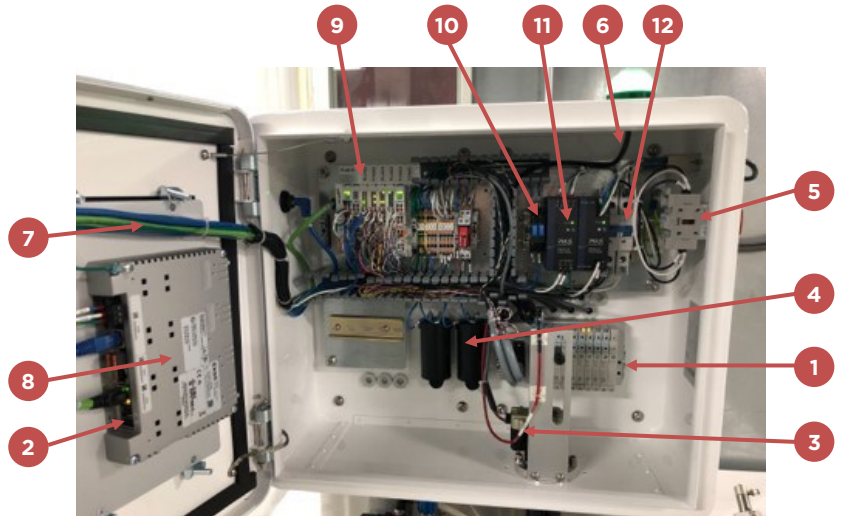
External Components

- 1. Status light
- 2. Main power entry
- 3. Main power disconnect switch
- 4. Panel opening latch
- 5. Emergency stop button
- 6. HMI



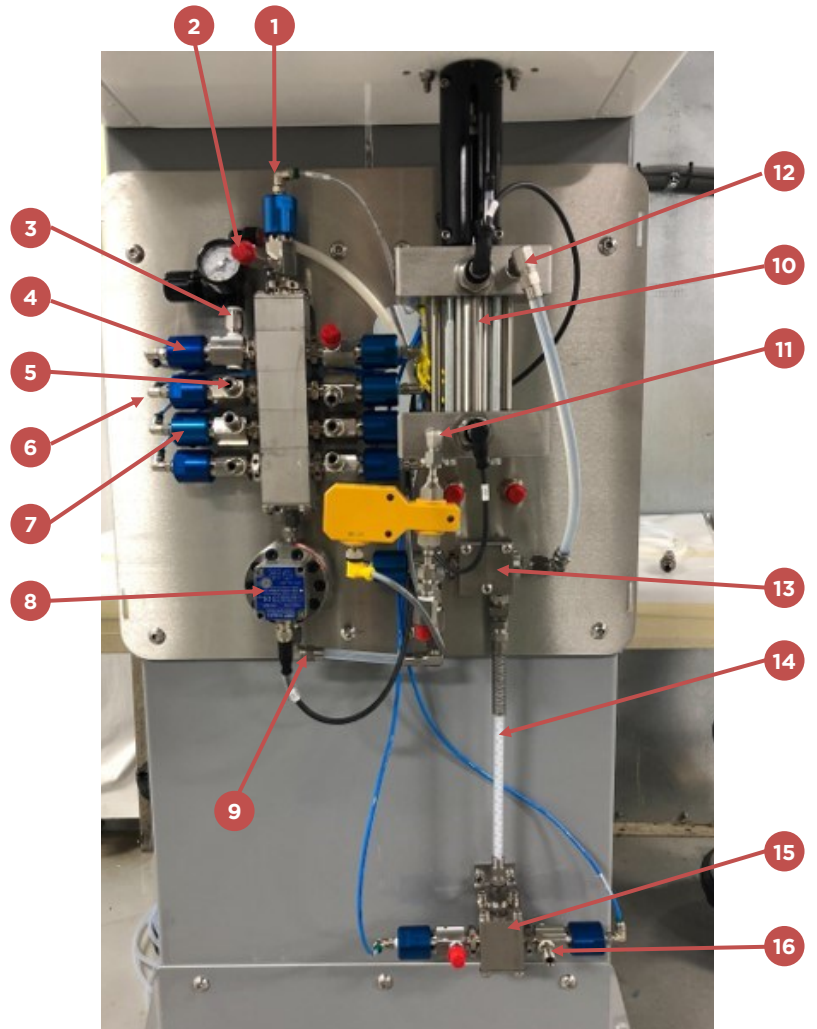
Internal Components

1. Solenoid stack
2. USB flash drive
3. Linear actuator
4. Air flow switches
5. Main power disconnect switch connector
6. Connection to status light
7. Connection to HMI and emergency stop button
8. HMI (Internal)
9. IO block
10. 24VDC circuit breakers
11. 24VDC power supply
12. Main power circuit breaker



Fluid Control Module

1. Solvent flush valve
2. Solvent input connection
3. Air input connection
4. Air push valve
5. Component A input connection (x1)
6. Connection to solenoids (x1)
7. Fluid valves (x1)
8. Component A flow meter
9. Connection to mix module
10. Component B pump
11. Component B input connection
12. Component B output (to mix manifold)

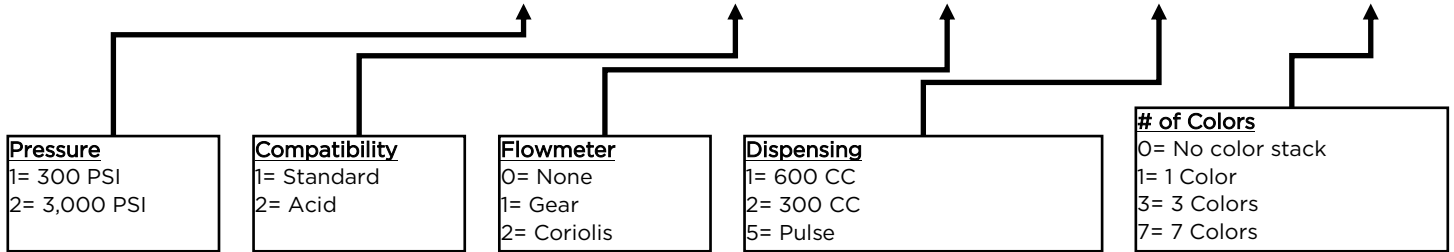


Mix Manifold

13. Mix block
14. Static mix tube
15. 2-gun manifold (optional)
16. Connection to gun (x1)

COMPLETE SYSTEM PART NUMBERING

RM2 - # # # # #



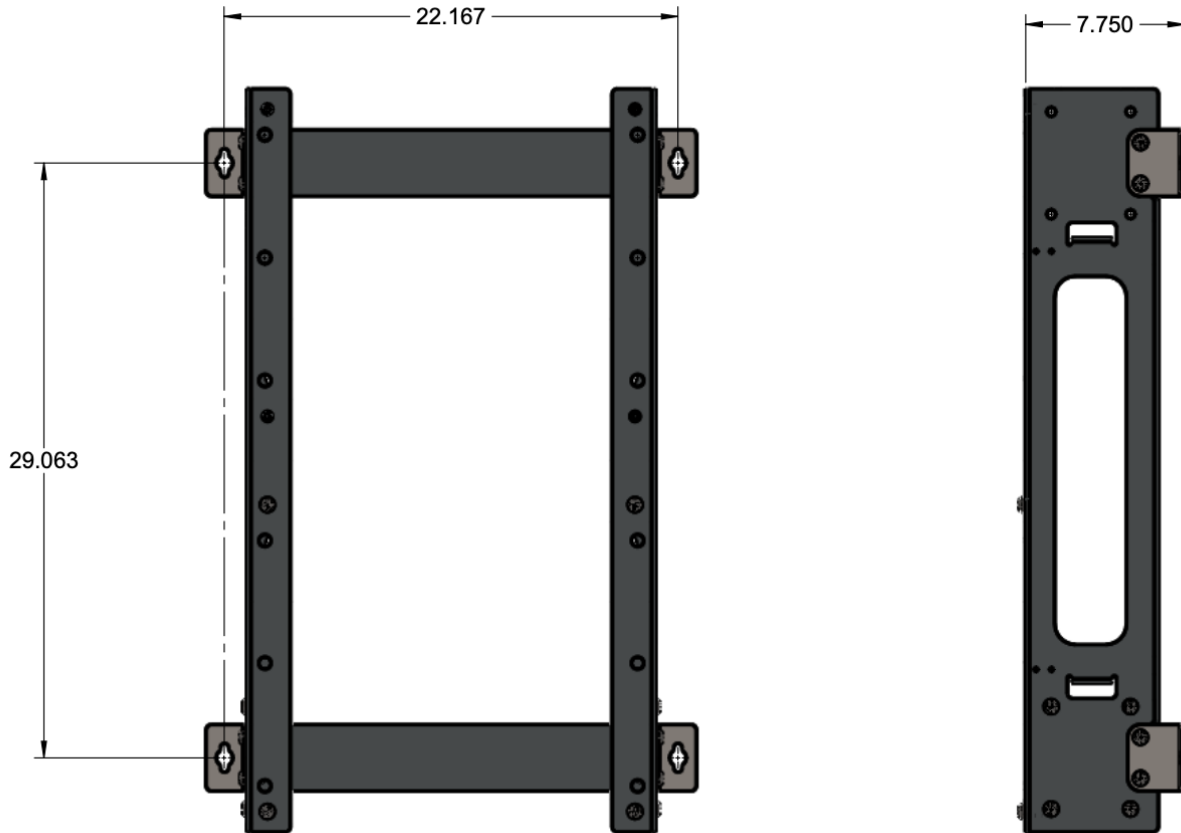
TECHNICAL SPECIFICATIONS

Item	Details
Max working air pressure	105 psi (7.2 bar)
Optimal working air pressure	75–105 psi (5.2–7.2 bar)
Max inlet fluid pressure	250 psi (17.2 bar)
Max B pump flow rate	10.1 or 20.3 oz/min (300 or 600 cc/m)
Min B pump flow rate	0.07 or 0.7 oz/min (2 or 20 cc/min)
“A” side flowmeter range	1.3–64 oz/min (10–1900 cc/min)
Operating temperature range	40–104° F (5–40° C)
System weight	130–150 lbs. (59–68 kg)
Viscosity range of fluid	20–3000 cPs
Mixing ratio range	1:1–100:1
Ratio tolerance range	Up to ± 1%
Wetted parts	300 series stainless steel, PTFE, perfluoroelastomer, UHMW polyethylene
External power requirements	100–240 VAC, 50–60Hz. 2.45A/1.55A, 16 AWG power supply wire gauge; NOTE:
Environmental	Indoor use, pollution degree (2)
Installation category	II
Max altitude	6500 ft (2000m)
Humidity	80% rH up to 88° F (31° C); decreasing linearly to 50% rH @ 104° F (40° C); max 80% rH non-condensing

WALL MOUNT DIMENSIONS

Requirements:

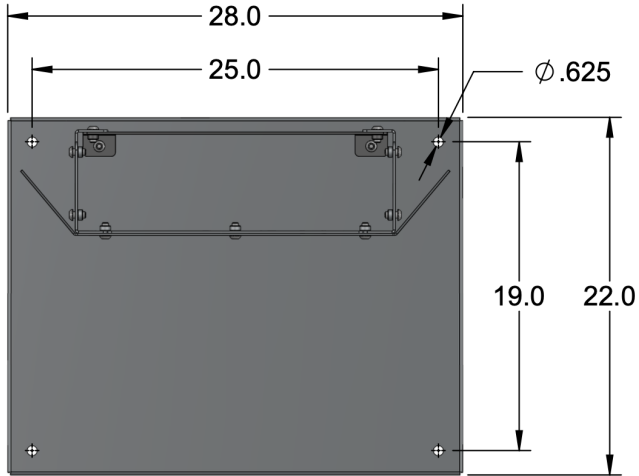
- Ensure wall is able to support weight of complete system, including air and fluid hoses and other connected devices. Minimum 91 kg (200 lbs.).
- Ensure clearance for electrical and fluid connections to system, and door swing radius.
- Bolt RM2's mast to wall or panel using minimum 4 each of 3/8" lag screws or cap screws with flat washers.



FLOOR STAND DIMENSIONS (OPTIONAL)

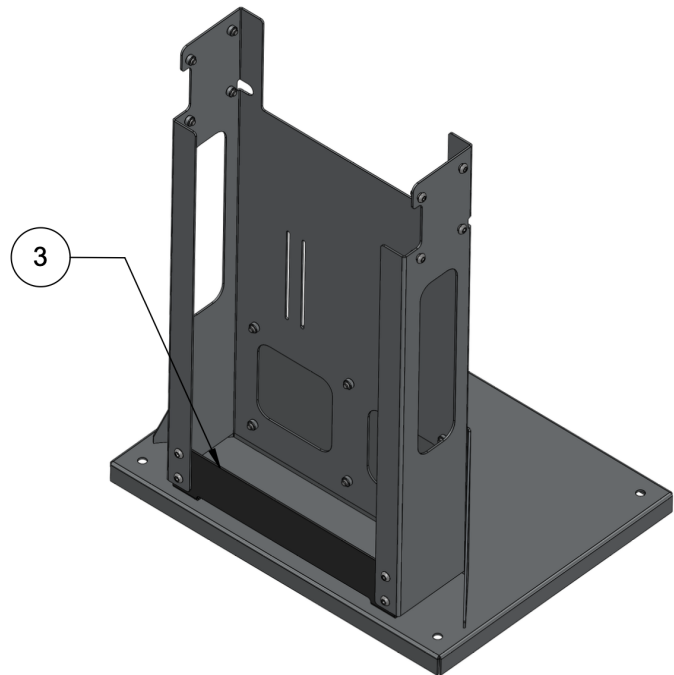
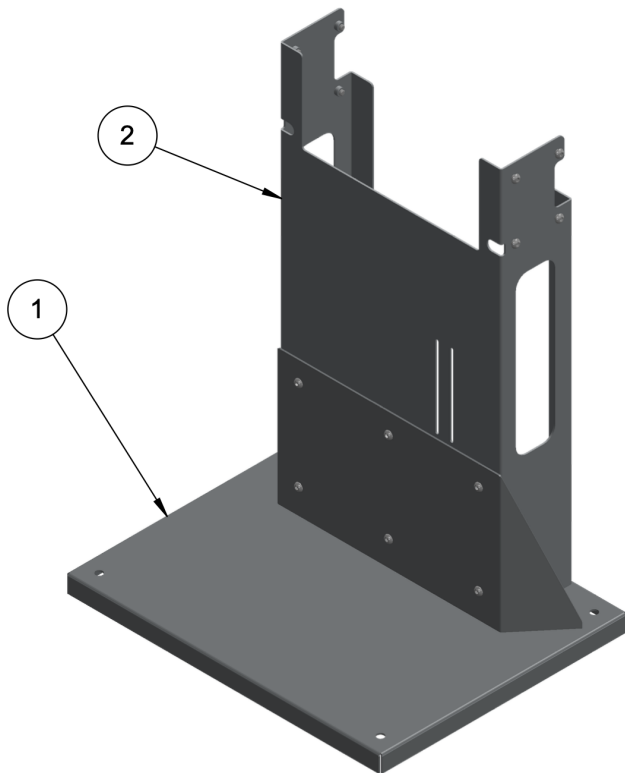
Requirements:

- Stand should be bolted to the floor.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	240-5310	BASE WELDMENT ASSY	1
2	240-5311	LOWER MAST	1
3	240-5314	LOWER MAST BRACE	1
4	20-7040	BHCS M10X1.5, 20MM LG, 18-8 SST	20

SECURE USING 4X 1/2" OR 9/16" (12MM OR 14MM) ANCHORS



INSTALLATION

Before operating the RM2, ensure all the below installation steps are complete. Schematics and further information are provided separately from this manual.

ELECTRICAL

The RM2 can accept either 120VAC or 240VAC as a power source. Its internal 24VDC power supply automatically detects the input voltage and produces control power accordingly.

Main power entry to the cabinet is located at the top right-hand side of the cabinet. It accepts a universal socket as a power connection.

WARNING

Before making electrical, air, and fluid connections to the RM2, be sure to understand and verify all requirements for installation, including but not limited to: electrical codes, OSHA requirements, NFPA requirements, and all applicable local codes and ordinances.

Read and understand all operating manuals for connected equipment. Do not supply RM2 with higher fluid or air

WARNING

Control enclosure cannot be placed in a hazardous location. Do not use equipment not approved for hazardous locations. Do not modify system equipment.

WARNING

To maintain non-hazardous classification of this equipment, the dispense pump and fluid panel components and assemblies must be monitored for leaks and serviced regularly to prevent leaks from occurring. If a leak is discovered, the system must be immediately shut down, de-energized, and repaired to correct the problem.

WARNING

The equipment is only to be used in the manner specified. If not used in the specified manner the protection provided by the equipment may be impaired.

WARNING

Do not replace the detachable main supply power cord with inadequately rated cords.

WARNING

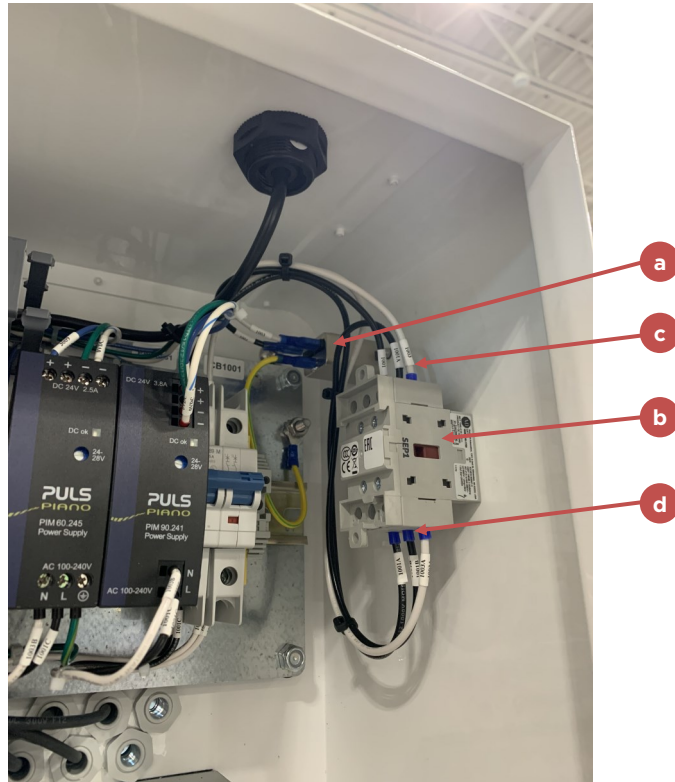
This equipment is intended to be installed outside of classified hazardous areas. While there are accessories for this equipment, sold separately, which will allow devices such as flowmeters to be installed within the hazardous zone, this

NOTE

Any conductive parts within 2.5m of this equipment (ladders, rails, fences, etc.) shall be bonded appropriately to ground.

Process

1. Locate the main power entry plug (a) in the upper right section of the cabinet
2. Locate the disconnect switch connector (b) inside of the control panel
3. Make sure the main power entry plug is connected at the top (c), opposite their secondary connections (d) below.



PNEUMATICS

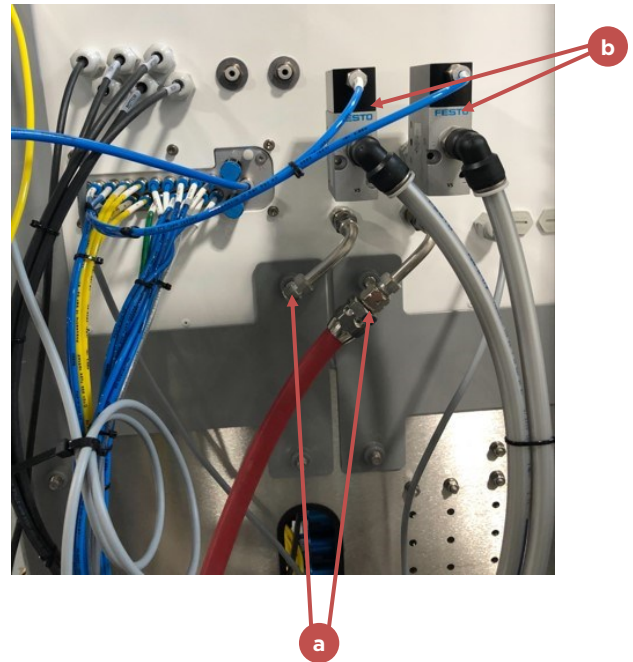
Always use clean, dry air to operate the RM2.
 The maximum air input pressure is 105 PSI / 7 BAR.

Pneumatic Connections

Depending on your application, there are 3 air input connections you need to complete before operating the system.

Gun Air Input

1. Locate the air inlet connection on the back of the system chassis (a).
2. Attach a 3/8" main air line with 1/4" NPS swivel connection to the air inlet.
3. If using two guns, connect an air hose to each inlet.
4. Air is routed internally through the Atomizing Air Cutoff Solenoids (b) which then are connected to bulkheads on the fluid panel that will connect to the gun's atomization air connection.

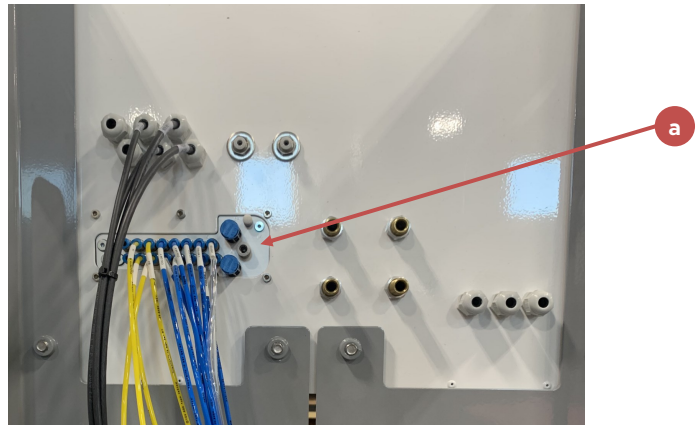


5. Attach a final 3/8" main air line in the front panel connector (c) that will lead to the gun's air input.



Solenoid Air Input

1. Locate the air inlet connection on the back of the system chassis (a).
2. Attach a 3/8" main air line to the air inlet.



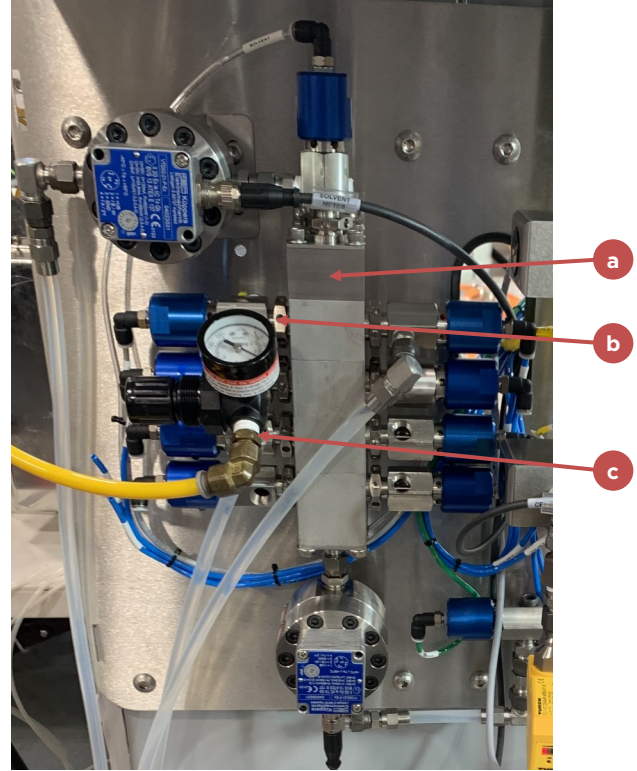
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Material A Air Input

1. Locate the Material A valve stack (a).
2. Locate the top right valve (b).
3. Using a 3/8" air line, connect your air source to the valve (c).

NOTE

It is recommended to install an air pressure regulator between your air source and the air valve to monitor maximum air pressure.

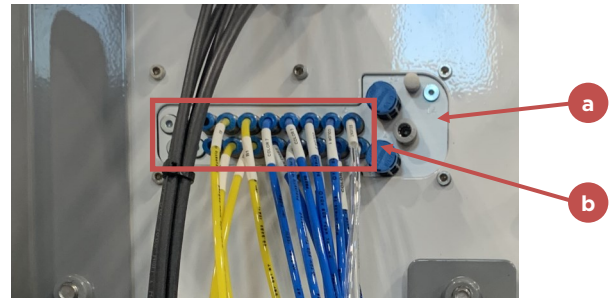


Internal Air Connections

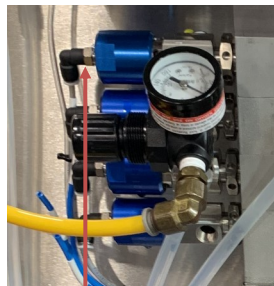
After connecting all of the air input hoses, the system required a couple of internal air connections before operating.

The following steps may have been completed by the factory before shipment.

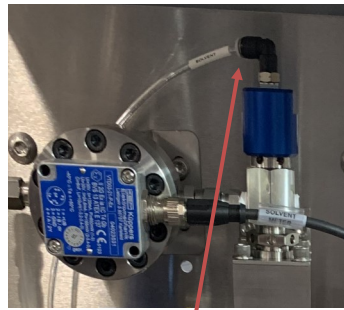
1. Locate the solenoid manifold on the back left side of the system (a). This manifold houses all the air outputs to the valve stacks for both materials.
2. Using the desired mapping, connect the manifold outputs (b) to each material valve (c), air valve (d), solvent valve (e), and mixing block valve (f).



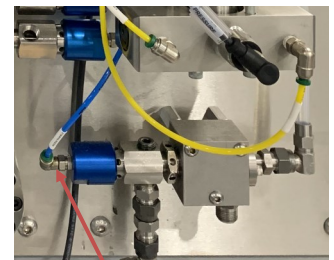
c



d



e



f

PAINT MATERIALS

Your system may include up to 7 material valves. The process to connect each is the same; repeat the steps below as needed. The number of valves on the stack will depend on your application and needs.

Paint resins and hardeners may be supplied to the RM2 system via pressure tanks or pumps. Fluid regulators are strongly recommended if supplying from a pump, and entrained air must be avoided.

Fluid supplied to the RM2 system must also be free of contaminants and solid particles that may clog the flow meter gears or other downstream components. Typical filtration for paint resins is 100 mesh (150 micron) or smaller. Contact your RM2 representative for information regarding fluid supply and conditioning equipment.

Use PTFE tape or liquid sealant on tapered pipe threads.

NOTE

The inlet fluid pressure to the B Pump should always be maintained 5 to 10% above the outlet pressure. This ensures proper operation of the Dispense Pump.

NOTE

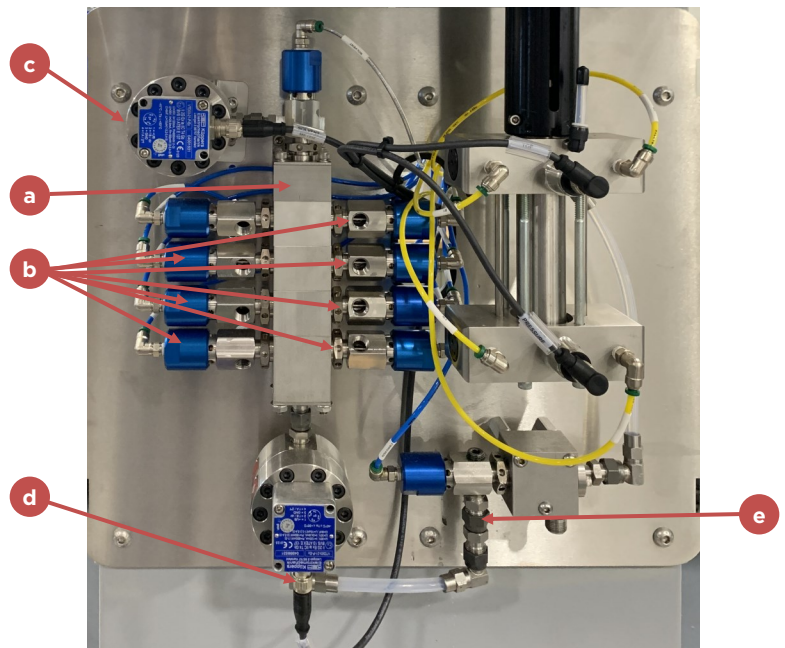
The static mixer assembly (240-3122) connects to the mix manifold outlet. The 240-3122 downstream end connection is 3/8" NPS male thread.

NOTE

F1 - F5 plugs may be removed from back of valves for connection to paint circulation systems.

Paint Material Connections

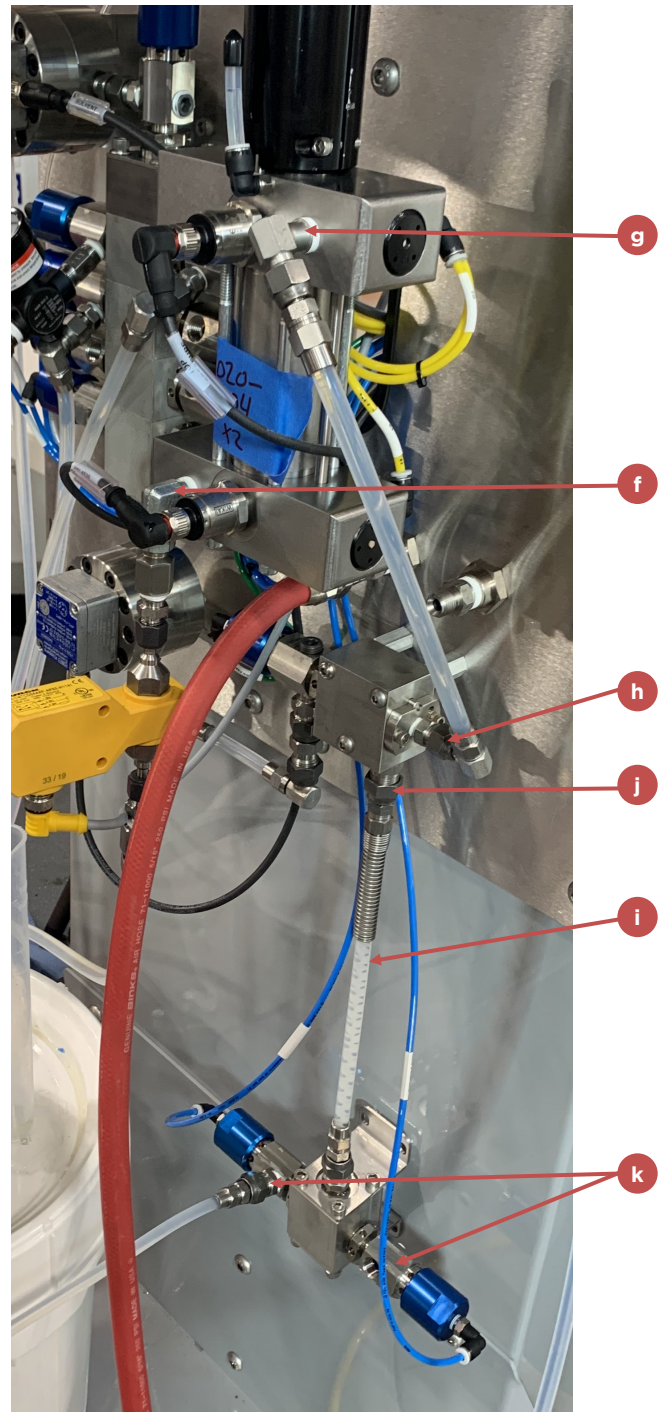
1. Locate the material valve stack (a).
2. Locate each of the material input connections on each valve on the stack (b).
3. Connect your material drums to the material input connection according to your desired mapping. Be careful not to mix different kinds of materials into the stack.
4. Connect your solvent drum to the input valve on top of the stack (c) using the input connection.
5. Connect the lower portion of the material flow meter (d) to the first input connector of the mix block



6. Locate the material B pump input connector (f).
7. Connect your material B hose into the pump inlet.
8. Connect a material hose between the pump outlet (g) and the second mix block connector (h).
9. Connect the mix block to the mixing tube (i) using the bottom connector (j).
10. Connect you gun material hoses to the bottom connectors of the mixing tube (k).

DISPOSAL INFORMATION

Prior to disposal of this equipment at the end of it's life cycle, all components containing electronic printed circuit boards (PCBs), sensors, and any wetted parts that may contain hazardous materials should be separated from the unit and recycled/ disposed of according to local regulations.



OPERATION

POWERING UP THE SYSTEM

Before powering-up the system, ensure that main power has been installed correctly. See section on electric installation for more details.

To power-up:

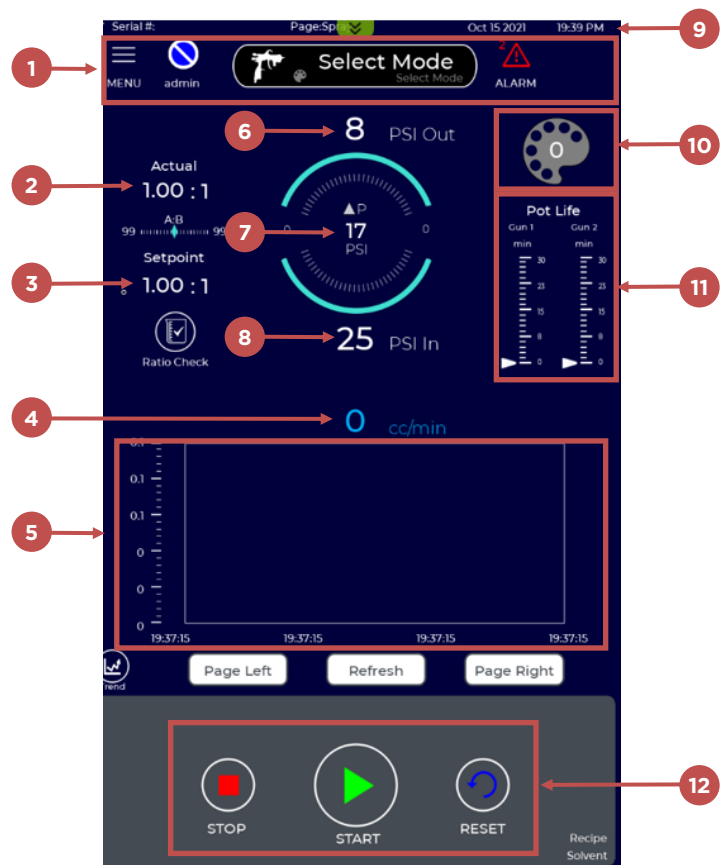
1. On the righthand side of the control module enclosure, turn the rotary disconnect switch clockwise. The system will go through a boot-up sequence. When ready, a button will be shown on screen to access the 'Main Menu'.
2. Pressing the Main Menu button will open the main menu.

USER INTERFACE GUIDE

The touch screen display is used to control the RM2. The following pages identify the various screens and their associated controls. Read and understand this guide to properly understand and operate the RM2 system.

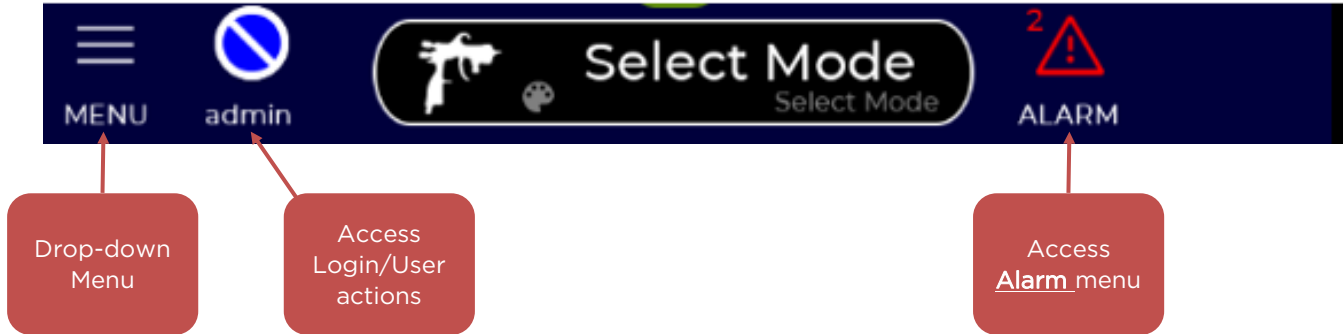
Home Screen Layout / Spray Screen

1. Navigation Bar
2. Measured Ratio
3. Target Ratio
4. Current Flow Rate
5. Flow Rate Graph
6. Outlet Pressure
7. Pressure Differential
8. Inlet Pressure
9. Current Time and Date
10. Currently loaded color
11. Pot Life Display
12. Run Menu



Navigation Bar

Except on certain menus that have special purposes, the navigation bar shown below will be visible in the upper section of the screen. Each section will be discussed separately in this manual.



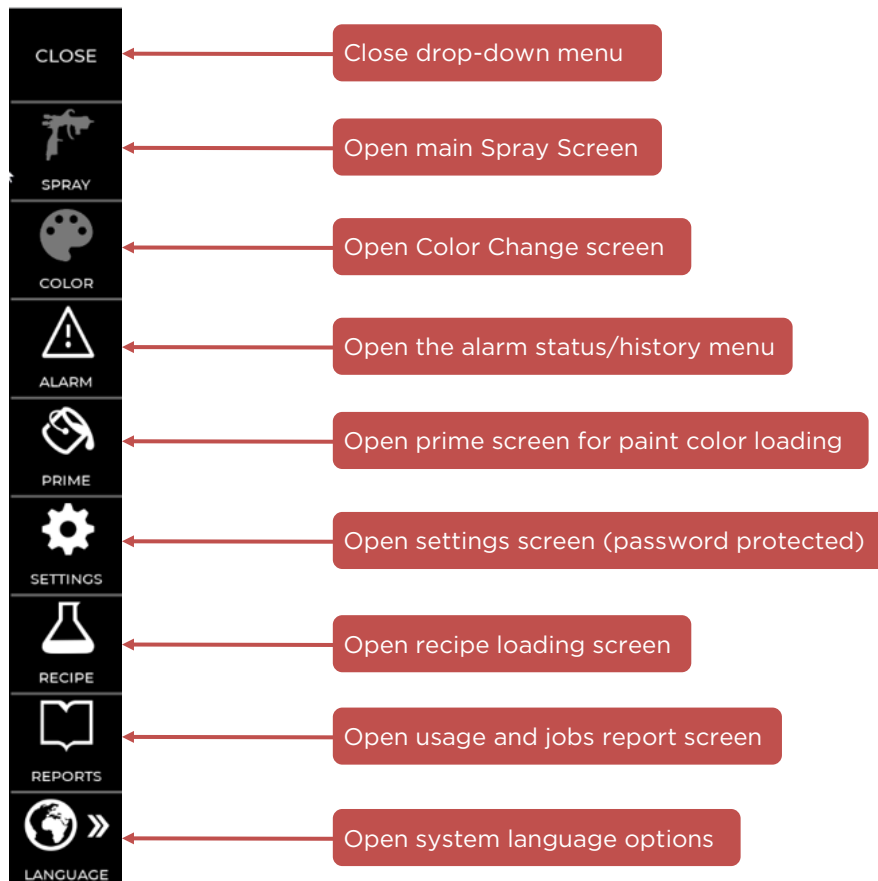
Pressing the **Menu** button opens a drop-down menu to access other menus.

Pressing **User** opens a dialog menu that allows log-in, log-out, and other functionality available to the administrator.

Pressing **Alarm** opens the alarm status/history menu.

Drop-Down Menu

Options available on the drop-down menu are shown below. Access to specific functions may be limited (greyed out) by the administrator for some users.



Color Change Screen

The color change screen is used for changing colors and flushing the system with the flush/load sequence programmed in the settings screen.

The screenshot shows the 'Color Change' interface with the following callouts:

- Current Color:** Displays the current color loaded in the system. It shows two gun icons (Gun 1 and Gun 2) with color selection buttons (1-7) and a 'Flush' button.
- Load Color:** Color selection for color switching. It shows two gun icons with color selection buttons (1-7) and a 'Flush' button.
- Time frames for color change sequence:** Time frames for color change sequence. It shows two tables for Gun 1 and Gun 2 with parameters like First Flush, Air Chop, Solvent Chop, Chop Time, and Last Flush.
- Total time for color change:** Total time for color change. It shows 'Estimated Flush Time' (58 Seconds) and 'Estimated time to Spray' (99999).
- STOP:** Stop flush sequence.
- START:** Start flush sequence.
- RESET:** Reset alarms.

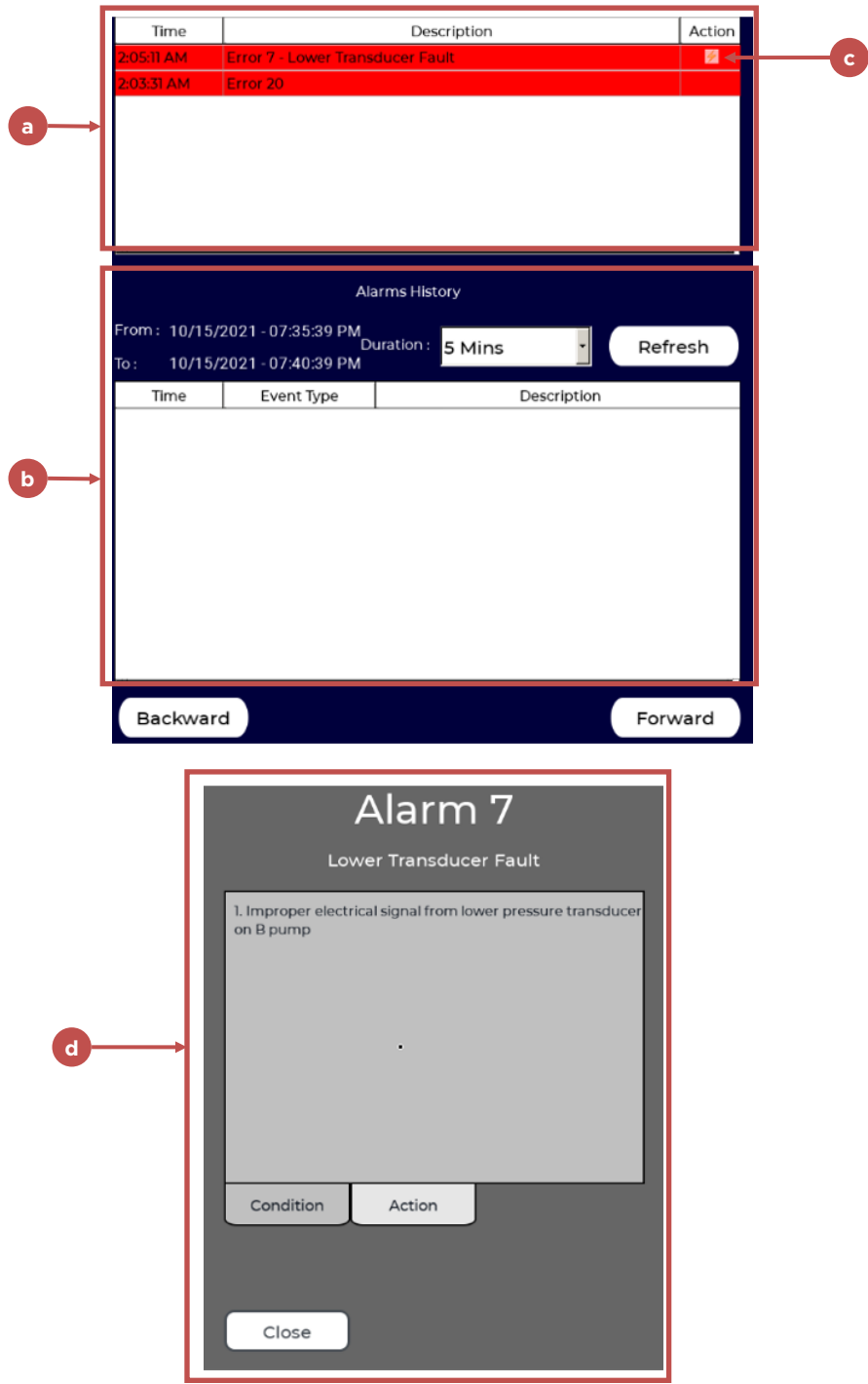
NOTE

If a flush box is present, the guns will trigger in succession when switching colors. If not, it is necessary to manually trigger them (first gun 1 and then gun 2). Both guns should not be triggered simultaneously, as it would be possible

Alarms Screen

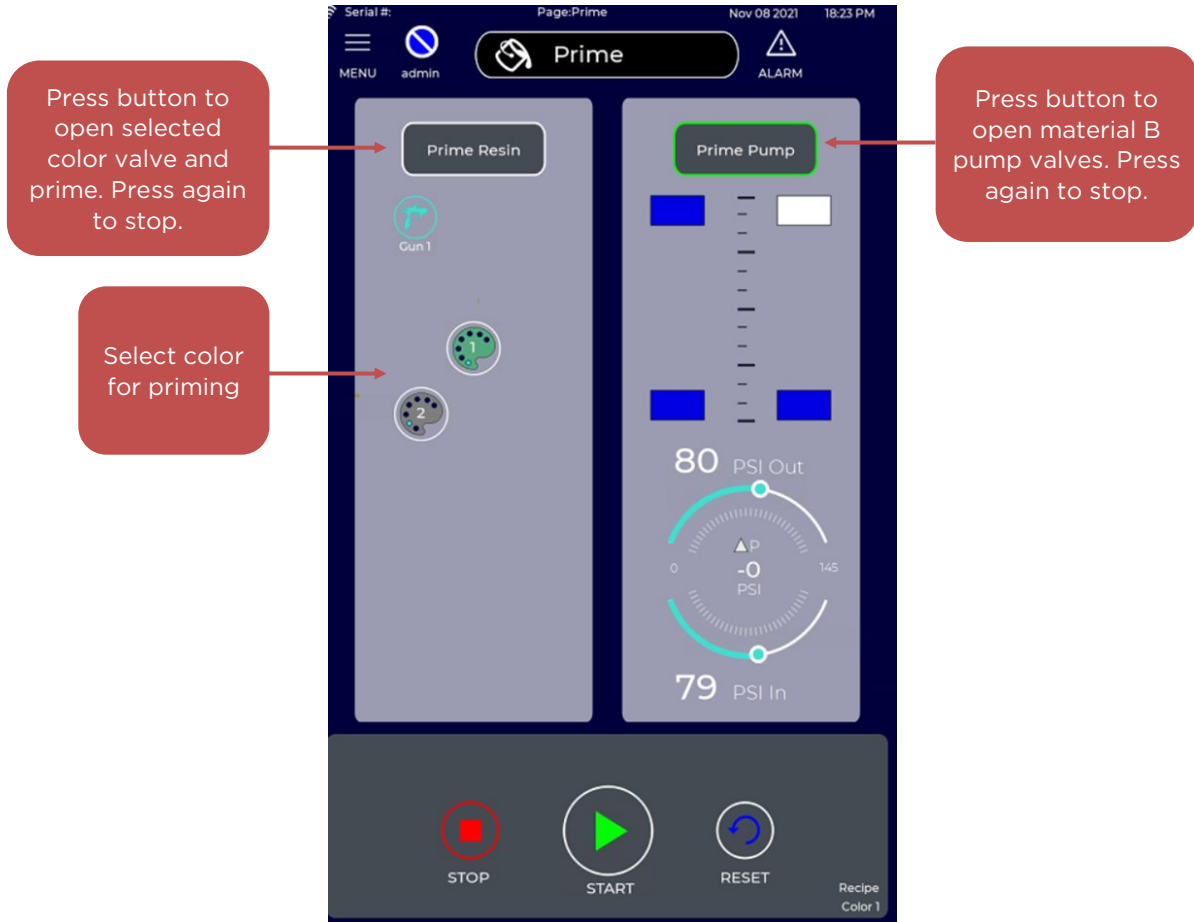
This screen displays all of the available system alarms (a). If an alarm sounds it will be highlighted, and the Reset button in the main spray screen must be pushed before the system can spray again. Alarm history (b) is also saved in this screen.

If an alarm has been disabled, the highlighted status will still be displayed, but the alarm will not sound. Click the individual alarm action button (c) additional details (d).



Prime Screen

Use this screen to prime the RM2 unit with Resin (A) and Hardener (B). Buttons will independently operate the Resin color valves (A0-A9), or the B Pump for material loading. Gun atomizing air must be off while priming.



NOTE
Gun must be triggered with atomizing air to allow the priming or flushing sequences.

CAUTION
Always follow the Prime mode with a solvent load to flush out the fluid lines and prevent mixed material from being sprayed or hardening in the system.

Settings Screen

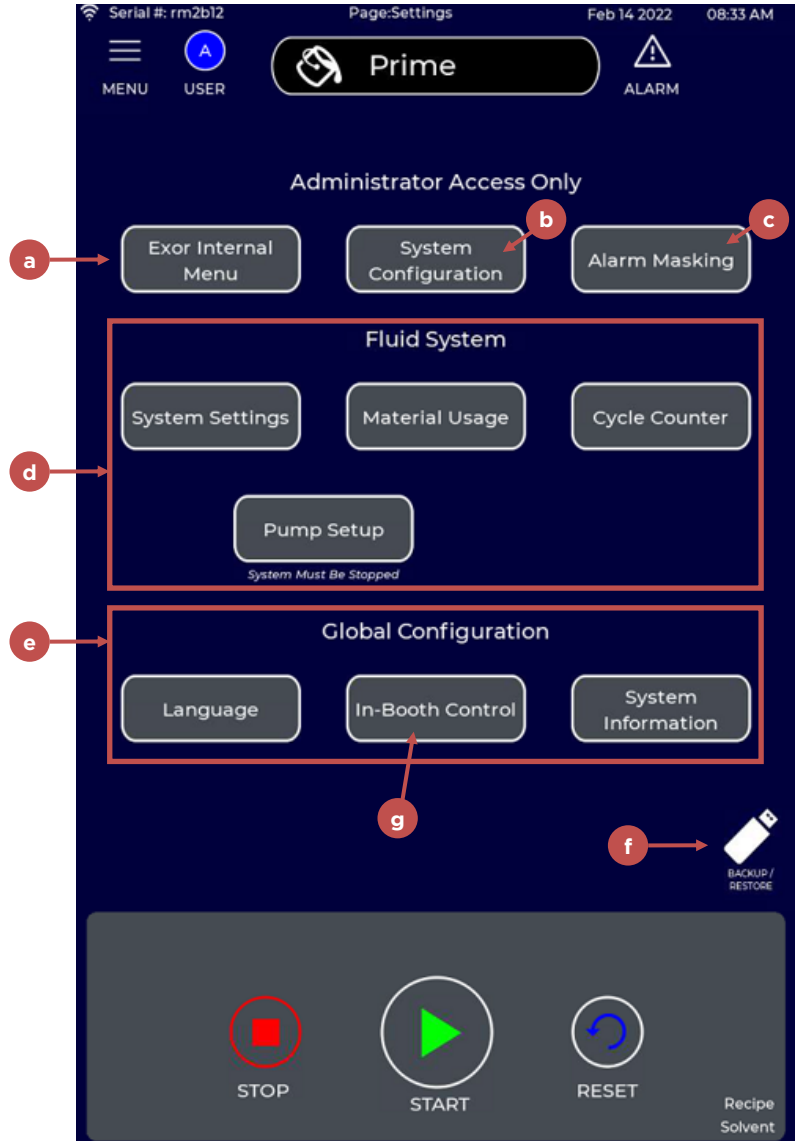
Select the settings button from the dropdown menu to access system settings. Before opening this screen a password prompt for access will take over the screen. Viewing or changing settings requires user permissions (varied between normal users and administrators).

Each screen will be reviewed separately in the next pages of this manual.

On the main setup page, the top four selections are available only to administrators. These are 'Exor Internal Menu' (a) which opens a popup dialog allowing internal settings for the Exor operator interface to be modified, 'System Configuration' (b)- which opens the system configuration menu, and "Alarm Masking" (c).

The next group of selections involve setting up the 'Fluid System' (d) which involves setting up material usage, cycle counter pump setup and settings. These selections are access-controlled by the administrator.

The next group of menus (e) are for modifying several miscellaneous parameters used by the system that dictate its behavior.



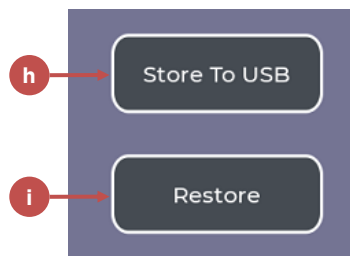
NOTE
This option (g) is only shown if selected in 'System Configuration'

Finally, the options for backing up and restoring settings will be found in the bottom right of this screen (f). This allows ALL system data to be stored to USB, or recovered (using the built in Linux file browser).

To Store - place USB in slot on the Exor panel. Press 'Store to USB' (h). File will be saved and called RM2Data.CSV

To Restore - press 'Restore' (i) and navigate to the file location. Select the appropriate file.

NOTE
You can access the USB storage location via a LAN (through FTP). To do this use a file transfer program such as WinSCP.

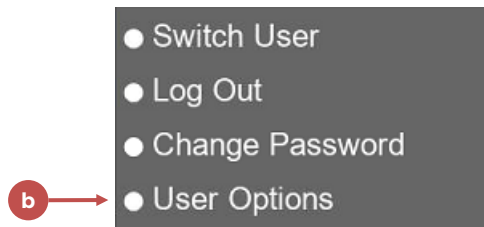


User Options

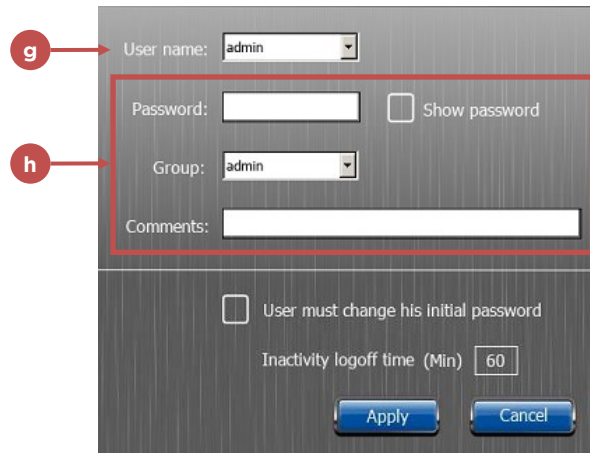
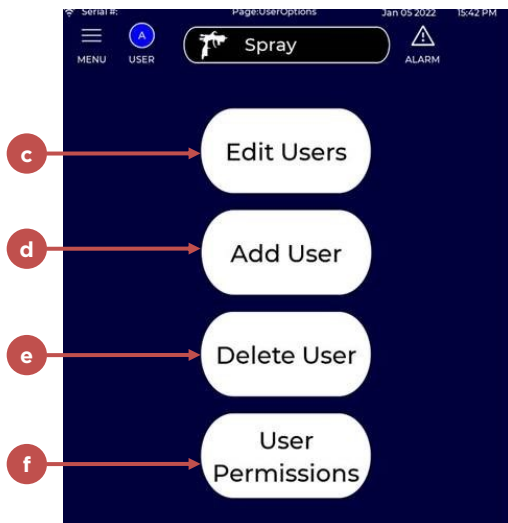
1. To access the user options page, log in as an administrator and then press the 'user' (a) menu key in the navigation bar to open the user actions dialog.



2. A dialog box will open and the administrator will see an option called 'User Options' (b).



3. From the user options menu you can Edit users (c), Add users (d), Delete users (e), or change User permissions (f).



Edit user

To edit a user, press the Edit Users menu.

Select the user you want to edit (g)

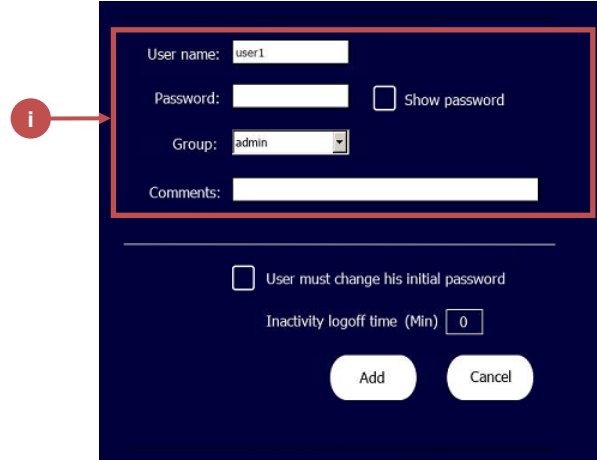
Modify the user's parameters (h). This includes user-group assignment.

Add user

The operator interface supports up to fifty individual users.

To add a user, enter the Add User menu.

Fill in the parameters (i) including user name, group assignment and initial password.

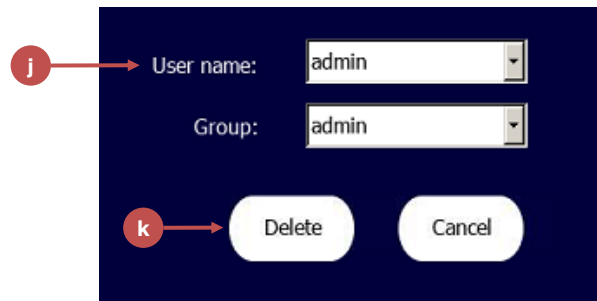


Delete user

To delete a user, enter the Delete User menu.

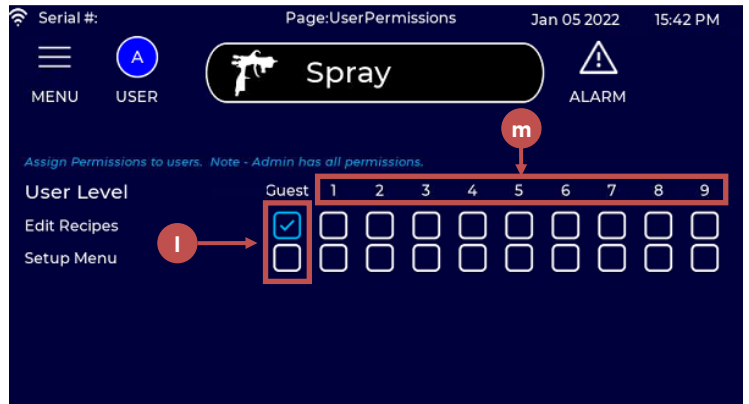
Select the user (j) you want to delete.

Click on delete (k).



User permissions

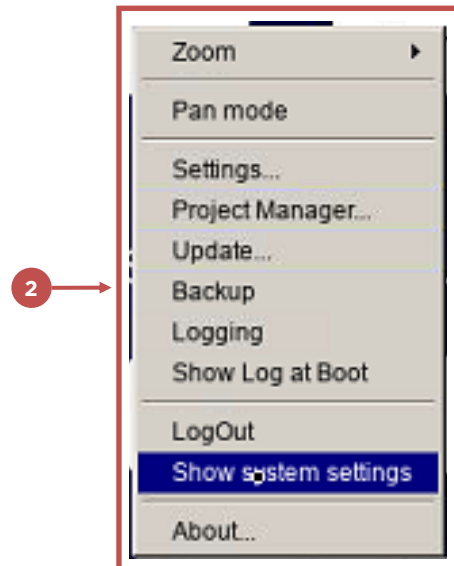
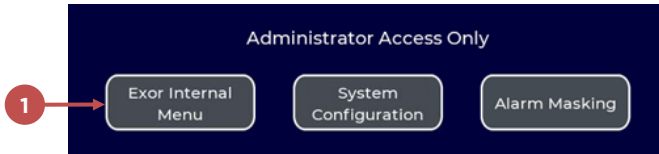
Various functions within the operator interface can have their access controlled depending on their group assignment. See more details about this in the 'Security' section in the 'Process Configuration' chapter. To assign rights to different user groups, enter the 'User Permissions' menu from the User Options menu, and select or deselect access for each function (l) by user level (m).



Exor Internal Menu

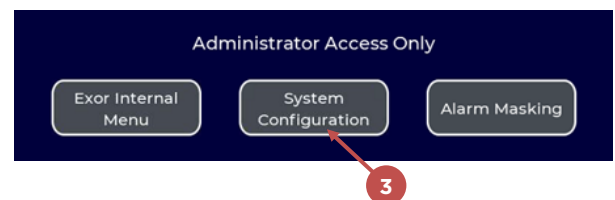
The Exor (1) dropdown dialog (2) allows access to the root settings for the Exor operator interface’s internal settings. Setting IP addresses for the three networks provided with the interface (described in the Installation section above), and setting the date and time displayed on the panel are the only operations that are necessary to operate the RM2.

For more information, consult the user manual for the Exor eX715 operator interface.



System Configuration

This menu (3) allows the configuration of the system according to the hardware that has been installed in the fluid section.

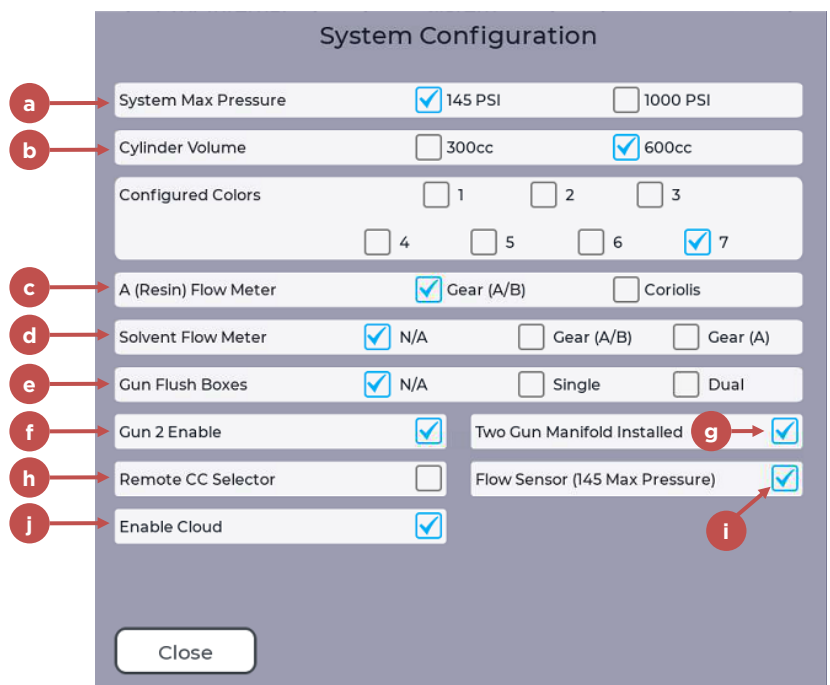


NOTE

It is very important that the parameters in this menu accurately depict the installed hardware, as system behavior is largely dictated by this. Incorrect settings on this menu could cause

The parameters are:

- a. **System Max Pressure:** Select the maximum fluid pressure that is allowed according to the hardware installed.
- b. **Cylinder Volume:** 300cc or 600cc pumps are available
- c. **A (resin) Flow Meter:** Select the flowmeter type that has been installed. Standard installations will use Gear A/B (quadrature) flowmeters, but Coriolis meters are also an option.
- d. **Solvent Flow Meter:** If installed, may be a Gear A/B (quadrature) or Gear A (single-channel) flowmeter.



Continued in next page...

- e. **Gun Flush Boxes:** Indicate if zero, 1 or 2 flush boxes are installed.
- f. **Gun 2 Enable:** Indicates that a second gun is installed, and this affects visibility of Gun 2 selections on other menus.
- g. **Two Gun Manifold Installed:** The two gun manifold enables the user to select one or both guns to be loaded, and disable guns that are not selected. This allows for less material waste and shorter purge times.
- h. **Remote CC Selector:** Indicates that a remote (in-booth) color change control box has been installed.
- i. **Flow Sensor (145 Max Pressure):** Indicates that a catalyst flow sensor is utilized for confirming flow of catalyst through the pump. This option limits the maximum pressure to 145 PSI.
- j. **Enable cloud:** Toggle to select whether cloud access is enabled or disabled.

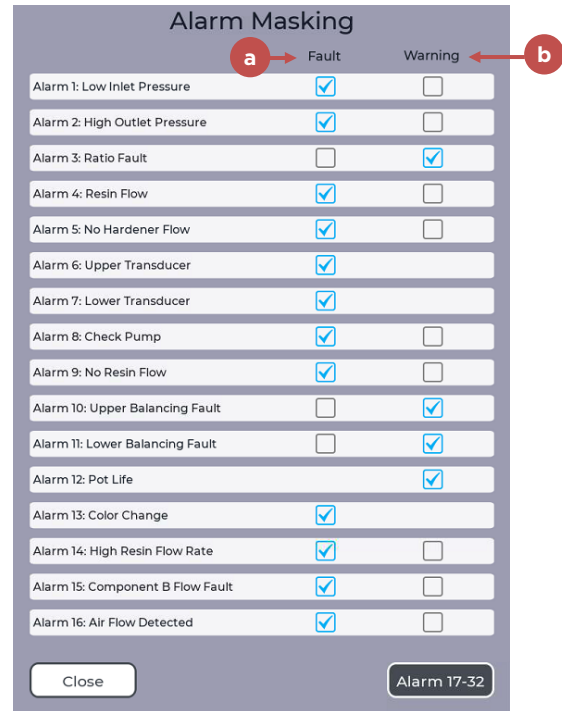
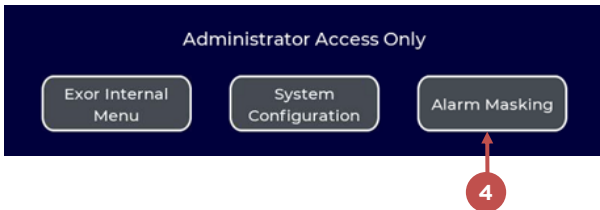
WARNING

Though unlikely, a malicious actor having access to the RM2 via the cloud service would have the ability to activate the unit remotely. The greatest hazard in this case is the potential for the release of chemicals while no personnel are present. However, this hazard is mitigated if the air and fluid supplies to the RM2 are deactivated when no personnel are to be present (as recommended in the safety section).

If it is suspected that someone has unauthorized access to your RM2. Contact your Corvina Cloud organization's administrator (This could be the distributor of your equipment). If this information is not known, contact Carlisle Fluid

Alarm Masking

This menu (4) allows individual system alarms to be treated as a 'fault' (a) which will shut down system operation, or 'warning' (b) which will display an alarm but not cause a system shutdown.

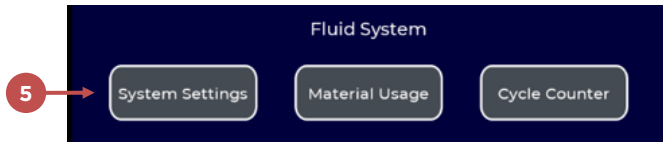


NOTE

Some alarms may be fixed to a 'fault selection' as it may be necessary for protection of the equipment or

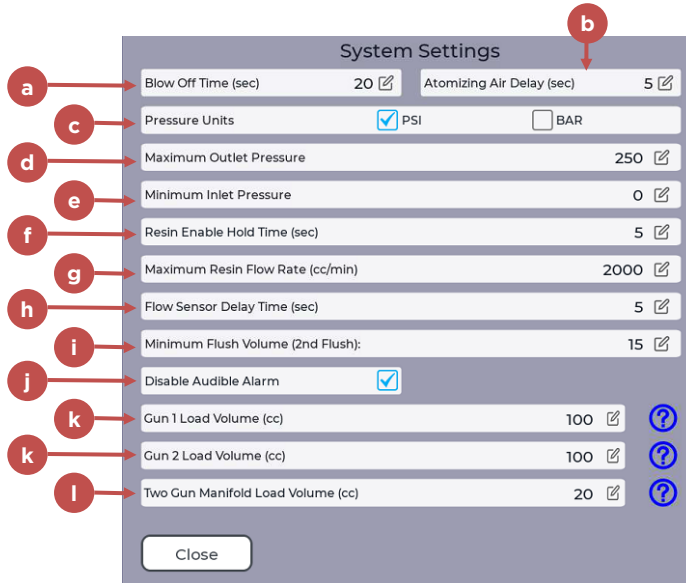
System Settings

Pressing the System Settings button (5) in the fluid system group, will open up the settings screen to the right. Some of these set values will trigger alarms on the system when upper or lower limits are exceeded during operations.



The customizable options available are:

- a. **Blowoff Time:** The time allowed between detection of a trigger through the atomization air flow sensor, and detection of fluid flow before a fault will occur.
- b. **Atomizing Air Delay**
- c. **Pressure Units:** Select pressure units to be displayed on the HMI (for visualization purposes only)
- d. **Maximum Outlet Pressure:** Maximum outlet pressure of the pump before a fault will be generated.
- e. **Minimum Inlet Pressure:** Minimum inlet pressure of the pump before a fault will be generated.
- f. **Resin Enable Hold Time:** Time after a loss of trigger input that the resin enable valve will remain on.
- g. **Maximum Resin Flow Rate:** Allows a fault to be generated and spray shut down if the gun is producing too much resin flow.
- h. **Flow Sensor Delay Time:** Amount of time for the hardener flow sensor to not detect flow after the gun is triggered before a hardener flow fault will be



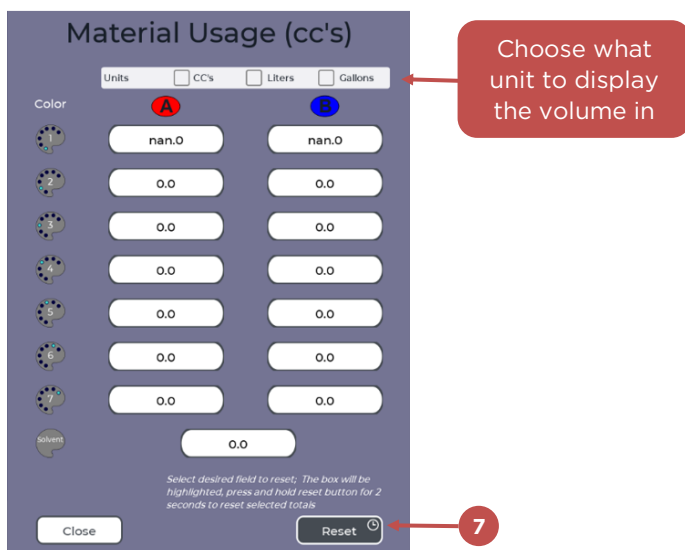
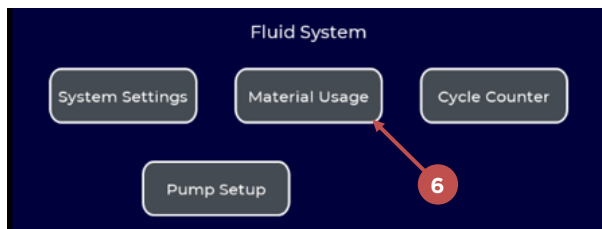
triggered.

- i. **Minimum flush volume (2nd flush):** 2nd flush phase of the purge process requires this much solvent is used in addition to the time being satisfied – a value of zero disables this feature.
- j. **Disable Audible Alarm:** Disallow the audible alarm from being active during a fault or warning condition.
- k. **Gun 1/2 Load Volumes:** The volume of fluid from the mix manifold to each gun. This is used in load operations as well as pot-life calculations.
- l. **Two Gun Manifold Load Volume:** Added to the gun load volumes to calculate the total fluid volume after the resin pump for pot-life calculations

Material Usage

Pressing the Material Usage button (6) will open up the volume totals per material and per color.

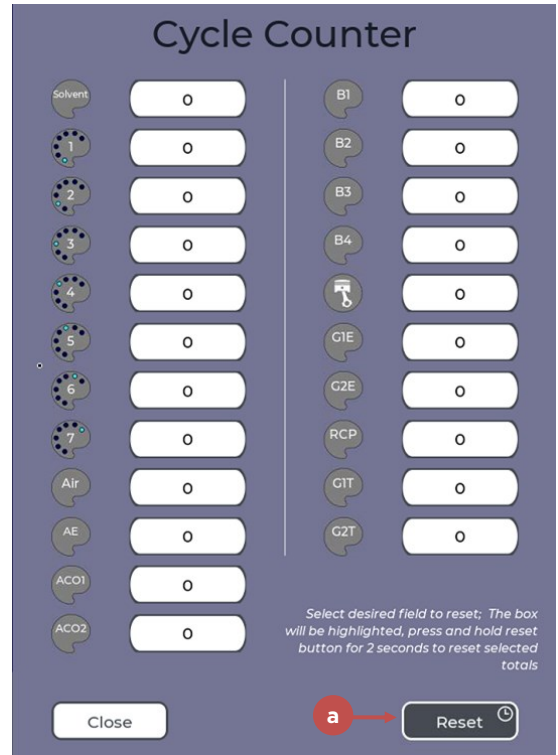
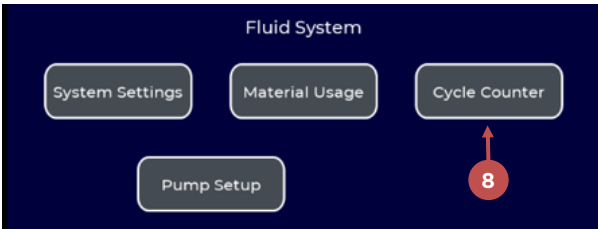
To reset the counter for a specific color, select the value to reset. The box will be highlighted. Press and hold the reset (7) button for two seconds.



Cycle Counter

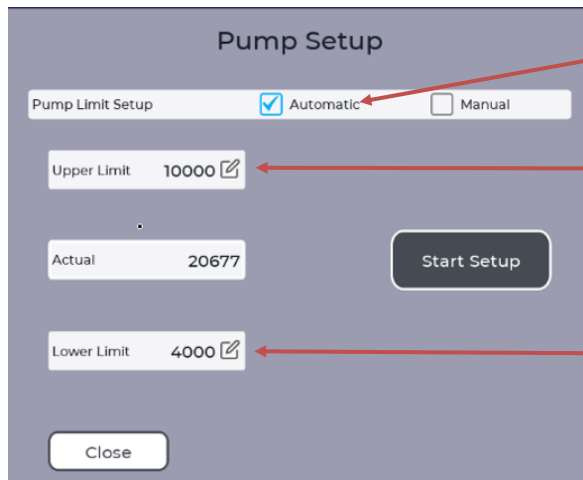
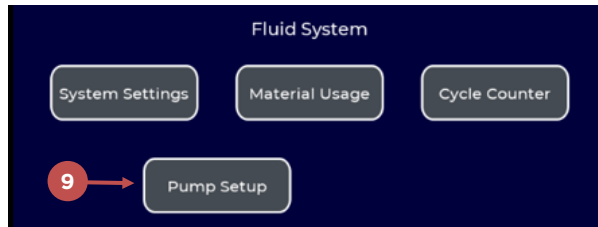
This menu (8) displays the amount of times each solenoid in the system has been activated.

If desired (due to replacement of a solenoid for example) to reset these values, select each field to be reset by pressing and highlighting the icon to the left of the value and press and hold the 'Reset' (a) button for two seconds. All selected fields will be set to zero.



Pump Setup

Pressing the Pump Setup button (9) will open up the pump settings menu to set lower and upper limits manually or setup it up for automatic updating.



Automatic setup

Manually change upper value

Manually change lower value

Language

Pressing the Language button (10) in the Global Configuration group, will open up the Language change dialog. You can also access these options from the Dropdown menu of the navigation bar in the bottom button. Choose the preferred language by clicking in the corresponding flag.



In-Booth Control—Remote color change box configuration

Press the In-Booth Control button (11) to open the Remote Color Change Box Configuration screen.

For calibrating the optional Remote Color Change selector box.

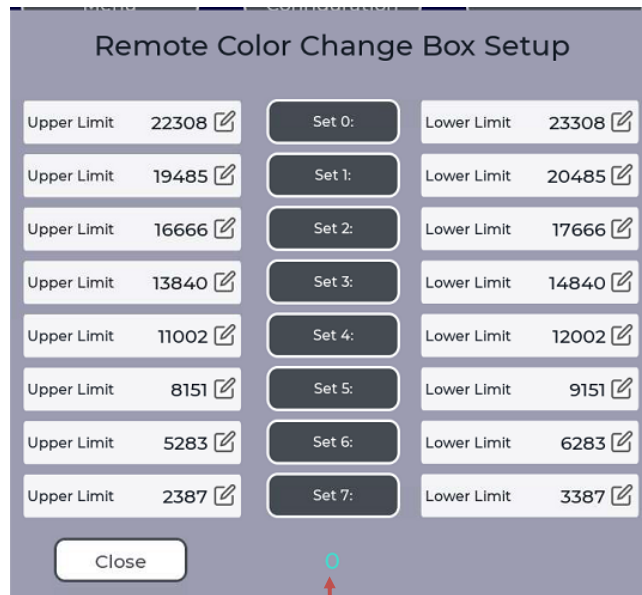
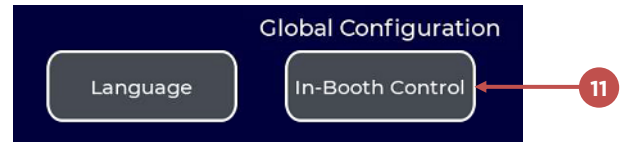
Each 'color' (0-7) selector switch can be set by pressing 'Set X' when an analog value is present.

Retrieve an analog value by asking someone to set the selector switch on the remote selector box when in this menu. A level of 500 below and above the measured value will be set.

Alternatively, the levels can be set manually by entering them in the associated fields.

NOTE

This button (13) is visible only if 'Remote CC Selector' is enabled in System Configuration



Digital value of the analog input reading from the Remote Color change box

The Remote Color Change Box is an optional purchase compatible with this system.

The color-change controller is connected through an Intrinsic Barrier (Zener Barrier) located outside the hazardous area to the RM2 device.

Instructions for installation of the remote color change box are included with it.



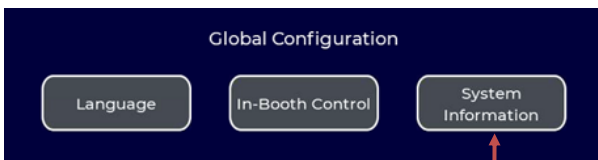
Select Color 0(Purge), or 1-7 (Colors 1-7)

When alarm is present, press and hold to clear and restart, otherwise pressing this will initiate a color change to the color selected.

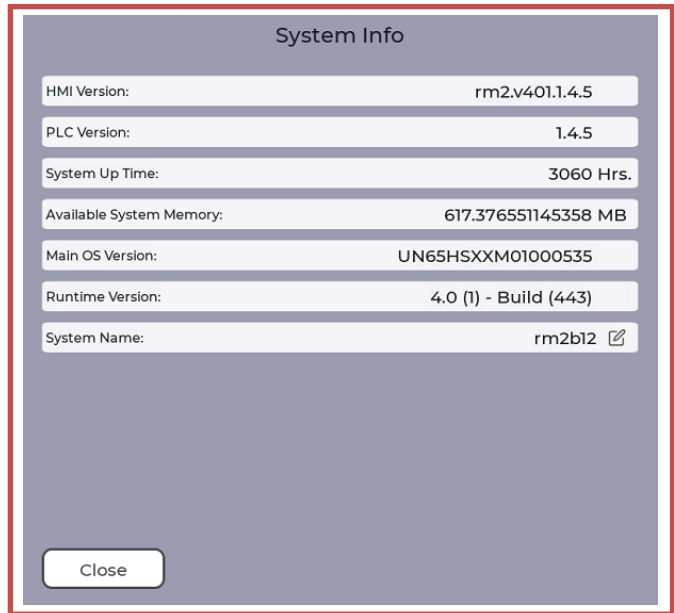
Alarm Indicator

System Information

The system information option (12) opens up a summary screen (13) with the touch screen software version, the PLC version, time the system has been used, total available memory in MB, the operating system version and Runtime version. This screen is automatically updated with the latest information when being updated.



12



13

Recipe Screen

The Recipe Menu allows set up of parameters that are specific to resins that are loaded.

In the top part of the menu are material parameters—these are:

Type (1K or 2K) - if 1K, the catalyst pump will not be activated (no mixing will be required) but flow rates will be measured and recorded and resin-max flow alarm will still be active.

Ratio: Opens a dialog allowing the ratio to be entered in terms of A:B, A:1, or %B depending on the desired methodology. The 'effective ratio' or A:1 ratio will be calculated from this and used by the system.

Pulses Per Liter: The number of counts per liter of material that passes through the flowmeter. This is somewhat material dependent and can be determined through a calibration process (see below). Note: For quadrature flowmeters, a count is registered for the positive and negative transitions of each channel, so essentially there are four counts per cycle.

The bottom part of this menu allows the definition of the flush sequence for each gun. Select the gun by pressing the button at the top of this panel. Flush sequence parameters are:

- a. First Flush Method: Solvent or Air. First step of the flush sequence activates this solenoid.
- b. First Flush Time: Amount of time for the first step of the flush process.
- c. Chop Time: The amount of time for the second step of the flush process, which consists of alternating the solvent and air cleaning valves or (solvent/air chop)
 - i. Air Chop Time: The time the air valve is active per step of solvent/air chop.
 - ii. Solvent Chop Time: The time that the solvent valve is active per step of solvent/air chop.
- d. Last Flush Time: The final step of the purge sequence consists of a solvent flush. This parameter determines the time that the solvent valve is on.

At the bottom of this panel, the Total Flush time (e) is calculated—this includes both gun 1 and 2 values.



Flushing Recommendations

Name	Suggested Initial Setting	Description
First Flush	AIR	Air or Solvent to initially flush fluid lines.
First Flush Time	15 seconds	Duration of first flush. This flush is used to move paint out of the system before attempting to “clean” with the
Air Chop Time	1 second	Duration of each air burst in the chop process
Solvent Chop Time	1 second	Duration of solvent burst in the chop process
Chop Duration	30 seconds	Total duration of chop process.
Last Flush Time	20 seconds	Duration of last solvent flush - should be timed to minimize solvent waste but still completely load the

The following factors will influence the choices listed above:

- **Worst case flushing** - Always set up the flush parameters using the most viscous/worst case resin material.
- **Flushing air and solvent pressure** - Higher pressures may reduce the time needed to flush the system, but can create significant spitting from the spray gun during the process.
- **Material viscosity** - Viscous materials move more slowly and may require additional time to be purged from the system.
- **Hose volume/ length** - Longer fluid lines encompass a larger volume and may require a longer flush time. Pressure drop through a longer hose or smaller diameter hose will affect the time required to purge paint and clean the system.
- **Spray gun tip size** - Small tips may restrict flow during a flush.

Try to optimize the system to minimize solvent usage during color changes and flushes by:

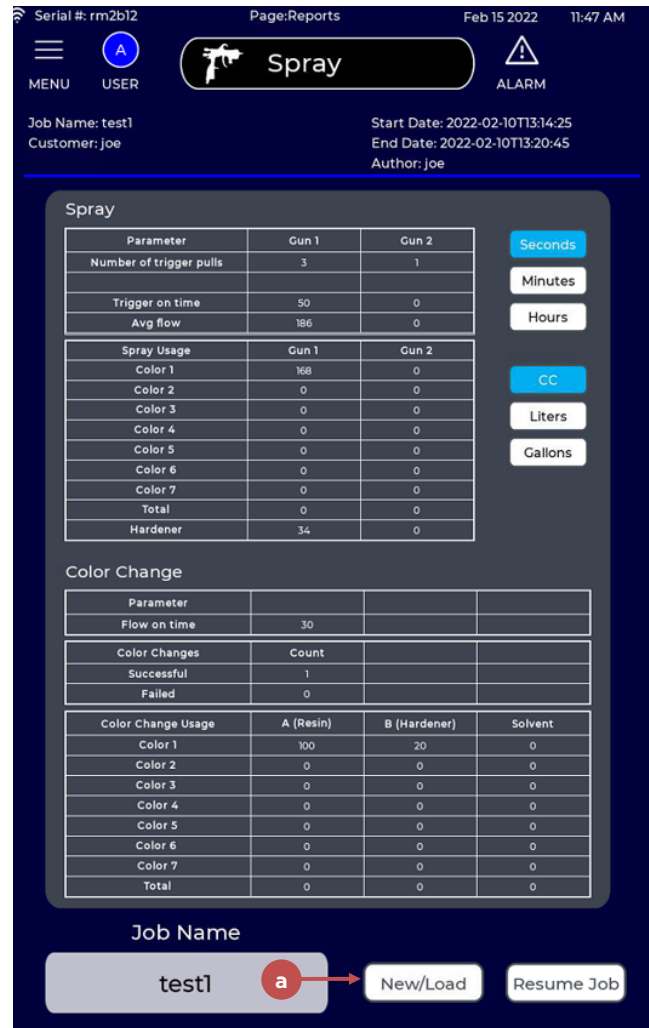
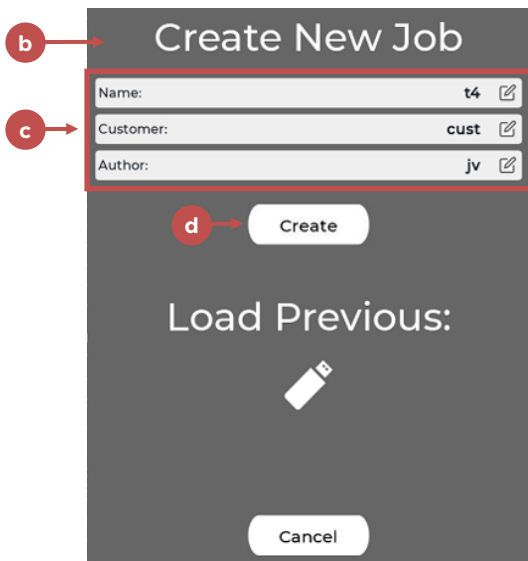
- Using air instead of solvent for the first flush
- Let the “chop” process do most of the cleaning
- Don’t use more solvent than necessary for the last solvent flush

Reports Screen

This menu allows process data to be tracked by 'jobs' that can be stored to a USB stick if installed in the HMI USB Slot.

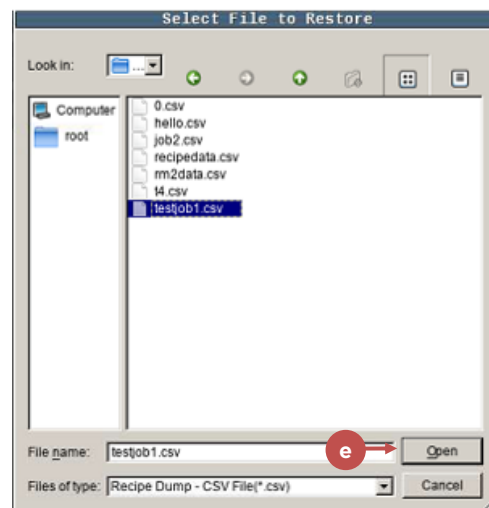
Job files in CSV format can be removed from the USB stick and stored and viewed through a CSV viewing software such as MS Excel.

Pressing 'New/Load' (a) opens a dialog (b) to create a new job, or select a job from the file system.



Enter the correct information in the fields at the top of the screen (c) and click create (d). A CSV file will be created with the name of the job (IF USB FLASH DRIVE IS INSTALLED).

Navigate to the job storage location (USB Stick located at: "\mnt\usbmemory\"), select the job you wish to restore, and click on Open (e).



STARTUP GUIDE

Use the following pages as a quick reference to make electrical, air, and fluid connections to the RM2 and begin operation. Familiarize with the configuration of the machine and any options or accessories attached. Return to the User Interface Guide section of this manual for information on configuration and settings.

Startup Checklist

Verify the frame is secured to the ground or wall and that all components are mounted securely to the enclosure, fluid panel or mast. Check that all cables for flow meter, flow sensor and any other electrical components are connected. Connect the enclosure ground stud to earth ground.

Verify all energy sources are de-energized. Inspect for loose wires anywhere inside the enclosure. Do not attempt to operate with loose wiring. Refer to the [Maintenance section for wiring diagrams](#). After wiring verification, it is safe to plug in the system to a proper grounded AC receptacle. Verify all CCV signal lines are properly connected. See the Configuration section for reference.

Air Connections

Connect the external air connections before use (see below). For more information, see Pneumatics section.

- Regulated air supply to the solenoid manifold.
- Regulated air supply to both guns on control enclosure. For atomizing, typically 20-75 psi [1.3 - 5 bar].
- Regulated air supply to the color stack flushing air.

If the system is equipped with gun flush boxes:

- Regulated air supply to gun flush box(es) “air” connection.
- Flush Box Trigger signals
 - Gun Flush Box #1: Connect to ACO GUN 1 Port (Without gun flush box, this signal is plumbed to the Atomizing Air Cutoff valve)
 - Gun Flush Box #2: Connect to ACO GUN 2 Port (Without gun flush box, this signal is plumbed to the Atomizing Air Cutoff valve)
- Gun In box signal lines to Gun 1 and Gun 2 Pressure switch inputs
- “Air Cutoff” signals from Gun flush box to the Atomizing Air Cutoff pilot signals (Note, without a flush box, this signal is fed from the ACO GUN 1 or 2 ports. Fluid Connections

Perform the following fluid connections before use. For more information, go the Paint Material section of this manual. Oil Reservoirs should be filled with pump packing lube supplied with the system.

- Connect hardener supply line to inlet of dispense pump or flow sensor.
- Verify dispense pump outlet is connected to mix manifold.
- Connect solvent supply line to the color stack solvent inlet.
- Connect resin material supply to color stack ports.
- Confirm flow meter outlet hose is tightly connected to the mix manifold material inlet.
- Connect static mix tube to outlet of mix manifold. Connect spray gun fluid line(s) to static mix tube.
- Energize all fluid lines and check for leaks of any kind. If any are present, be sure to remove pressure and repair the leak before continuing with the Startup Procedure.

Startup Procedure

When air and material connections have been tested for leaks the machine should be ready to power on.

Startup for systems without gun flush boxes

1. Ensure all compressed air and fluid sources are connected to the RM2 and energized.
2. Turn the AC lock out switch to the on position. Select the PRIME button on the dropdown menu.
3. With atomizing air off for this step, trigger the spray gun into a grounded metal waste container. Press the B Pump enable button and allow the pump to stroke for at least 2 full cycles (typically about 30 seconds), allowing all air to be removed from the inner chambers.
4. Press B Pump enable again to stop. Release gun trigger.
5. Ensure Color 0 shows in the display box and press Resin enable to open the solvent valve. Trigger the gun until solvent is loaded in the fluid lines.
6. Repeat the Resin load process for all system colors to ensure functionality and to clear air from the fluid lines. After each color has been loaded into the fluid lines, be sure to load with solvent (color 0) so that the inner passageways remain clean and all air is removed.
7. Return to the Home screen by pressing the Spray Button in the dropdown menu button.
8. Press the Settings button on the dropdown menu. Proceed through each page and enter the desired values. Refer to User Interface Guide for more information about each screen.
9. Verify the Pot Life Check Volume (cc) setting is correct for the fluid line setup. [Refer to the Hose Size table below.](#)
10. For each color used in the system, an initial calibration must be performed to maintain a proper mixed ratio.
11. Open the Color screen and load the desired color.
12. After the completion of the color load energize atomizing air and spray.
13. When spraying is complete, shut off atomizing air and perform a color change or flush as required.

Startup for systems with gun flush boxes

1. Ensure all compressed air and fluid sources are connected to the RM2 and energized.
2. Turn the AC lock out to the on position. Select the PRIME button on the dropdown menu.
3. Place the spray gun in the gun box and close the lid.
4. Press B Pump enable and allow the pump to cycle for about 30 seconds to prime the pump and hardener line to the mix manifold. Press again when the Pump is primed and no air bubbles are visible in the fluid line leading to the mix manifold.
5. Ensure color 0 shows in the display box and press Resin enable to prime solvent. Press again when solvent is visible downstream from the mix manifold.
6. Repeat this process for the remaining paint colors. Follow up this prime process with a color 0 (solvent) prime again to clear resin from the lines and mix manifold.
7. Press the Spray button in the Dropdown menu.
8. Press the Settings button in the Homescreen menu. Proceed through each page and enter the desired values. Refer to User Interface Guide for more information about each screen.
9. [Verify Pot Life Check Volume \(cc\) using the chart below.](#)
10. For each color used in the system, an initial calibration must be performed to maintain a proper mixed ratio.
11. Press the Color button on the dropdown menu and load the desired color.
12. Remove the gun from the gun box, close the gun box lid, and spray.
13. When spraying is complete, place the gun in the gun box and close the lid. Perform a color change or flush as required.

Hose Size	15 ft	25 ft	50 ft	75 ft	100 ft
1/4" ID est. volume	225 cc	325 cc	600 cc	875 cc	1150 cc
3/8" ID est. volume	400 cc	625 cc	1200 cc	1775 cc	2350 cc

DAILY OPERATIONS

Daily use of the RM2 system involves several procedures. Understanding how the system works and knowing the properties of the paint materials in use is the best way to ensure continuous use with few alarms and repairs. Study the procedures and tips below to better understand the function of the system. Refer to the Maintenance section of this manual to review maintenance schedules and repair procedures.

Daily Start Up Procedure

Follow the steps below during startup to ensure proper operation and optimal safety. These daily procedures assume paint solvents, resins, and hardeners have been loaded into the machine, have already been calibrated, and remain connected between each use of the system.

1. Ensure all fluid and air connections on the system are tight and secure. Ensure fluid supply is adequate for duration of operations.
2. Check all valves on the system for fluid supply leaks. Correct if necessary.
3. Connect regulated pressurized air to the system and open. Maintain 75psi (5 bar) minimum at all times to the enclosure main air inlet.
4. Energize fluid supplies and open valves supplying RM2 with resin(s), hardener, and solvent.
5. Connect power and turn the power switch to the 'On' position.
6. Navigate to the Alarms History page. Verify no alarms have occurred recently. If an alarm has occurred, verify that the problem has been resolved.
7. Load the desired color. Go to Loading a Color section for additional detail.
8. Verify Inlet and Outlet hardener pressures are correct for the application, and that the Inlet Pressure is 2-5% higher than the Outlet.
9. If using a gun flush box, remove the gun from the box and begin to spray. If not using a gun box, turn on atomizing air and begin to spray.
10. Fine tune gun settings for the application (flow rate, atomizing air pressure, fan control). Remember that changing the resin pressure to adjust flow rate at the spray gun should be followed by a matching change to the hardener pressure to maintain the 2 to 5% higher target inlet pressure.

CAUTION

If using a GUN BOX, ensure gun is in box with the lid closed. If loading a color or flushing without a gun box, ensure atomizing air is turned off, and trigger material into a grounded metal waste container.

Loading a Color

Follow steps 1 through 8 of the Daily Start Up Procedure section before proceeding.

Go to the Home screen and ensure atomizing air is turned off. For systems with gun flush boxes, place the gun in the box and close the lid.

Press the Color button on the dropdown menu to access the Color Change screen.

Enter the color number desired, and press 1 GUN GO or 2 GUN GO to load the color to one or both guns respectively. If not using a flush box, trigger the gun into a grounded metal waste container. When loading a color if the current color is 0, the fluid lines will not be flushed, since it is assumed there is no material in the lines following the End of Day Flushing Procedure.

The color should be loaded and ready to spray. If adjustments need to be made to the flush sequence, go to Flushing Setup. If an Alarm occurs, correct the problem and restart the procedure.

NOTE

For a color change with gun flush boxes, the GO button will not display if:
The spray gun(s) are not in the Gun Box(es).

Color Change Procedure

To change colors, the initial color must be loaded per Loading a Color procedure.

Press the Color button on the dropdown menu to access the Color Change screen.

Enter the color number desired, and press 1 GUN GO or 2 GUN GO to load the color. The system will proceed to flush the gun(s) in sequence and then load the desired color at the mix ratio for that color.

The color selected will be loaded, completing the color change procedure. Enable atomizing air to start spraying. If an ACO valve is installed it will enable atomizing air after the gun air delay time has passed.

End of Day Flushing Procedure

To shut down the machine for longer periods or overnight follow the steps below.

1. Flush the Mixed Material using one of the methods below.
 - a. Color 0 Load: Perform a color 0 load to clear the fluid lines of material and load with solvent. For information on loading, see Loading a Color.
 - i. If the fluid lines are not fully flushed, adjust the Flush / Load Sequence values as necessary.
 - ii. When Flush / Load values are correct, go to Flush mode and trigger gun to remove the mixed material remaining in the fluid lines. The machine will go into an air/ solvent chop until the button is pressed again, or until 5 minutes have passed. Typically, 30 seconds of flush mode will clear a standard 25 foot hose.
 - b. Flush Mode:
 - i. Press the button for Flush mode (found on the Prime screen) and allow the valves to cycle until the fluid lines have been cleared of mixed material. Perform a color 0 load to fill the fluid lines with solvent.
2. Always ensure there are no mixed materials remaining in the fluid lines when shutting down for the day.
 - a. Optionally, power off the RM2 using the AC Lock Out Switch.
3. Depressurize all fluid supplies and close fluid supply valves. Depressurize system air pressure.

CAUTION

Always shut down the RM2 with flushed fluid lines that are loaded with solvent (color 0). Leaving air or paint in the system may cause clogging or sticking of system components.

System Depressurization Process

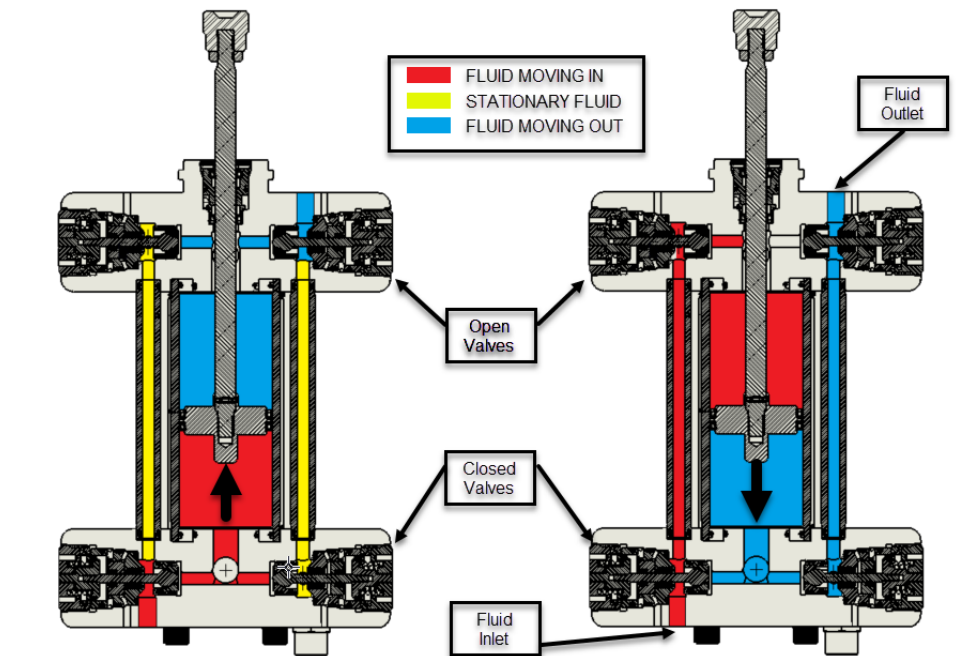
1. Flush the system if it will not be used for extended periods. Ensure all guns are in gun flush boxes, and that lids are securely closed. If not using flush boxes or ACO, shut off atomizing air for the next steps and use a grounded metal waste container.
2. From the dropdown menu, press the Color button. Enter Color 0 (Solvent) and press 1 GUN GO (or 2 GUN GO if two guns are in use). If not using a flush box trigger the spray gun.
3. Wait for the system to flush the fluid lines and load the solvent. This will purge resin from the color stack and flow meter and also remove mixed material from the mix manifold. If there is still material visible in the lines, Load color 0 again, or switch the system to Flush mode as long as needed to clear any debris from the fluid lines.
4. Shut supply of all paint resin and hardener. Do NOT shut off solvent supply yet - it will be needed in a later step.
5. The fluids in the Color Stack and Dispense Pump are still under pressure. To release this pressure, go to the Prime screen.
6. On the Prime screen press B Pump Prime to engage the B Pump and cycle it to release any internal pressure. Allow it to run for 5 seconds, and then press B Pump Prime again to stop.
7. Press Color Stack Prime with the spray gun triggered and open color stack valves 1 through 5 to bleed pressure. Finally, open valve 0 to allow solvent through the system until all lines have been flushed with solvent. Press Color Stack Prime again to close valves.
8. Shut off Solvent supply to the system. Trigger gun and press Color Stack Prime again, opening valve 0 to bleed remaining pressure in the solvent valve.
9. Power off the system. Shut the main air supply to the system.

B PUMP OPERATION

Material is delivered to be mixed by a piston and cylinder dispense pump. An inlet and an outlet valve on each end of the pump controls the material flow. When the piston is moving down, the bottom inlet valve is closed, and the bottom outlet valve is open. As the piston moves down, the material in the cylinder below the piston is dispensed through the bottom outlet valve. Also as the piston is moving down, the top outlet valve is closed and the top inlet is open. This allows material to be drawn into the top of the cylinder above the piston. When the piston gets to the bottom of its stroke, the valve settings and the piston direction reverse. This causes the material in the top of the cylinder to be dispensed, and the bottom of the cylinder to be filled.

A balance mechanism is programmed into the system controller to minimize pressure fluctuations at piston reversals. This logic assumes that the inlet material pressure is higher than the dispenser output pressure. When the dispenser reaches the limit of the potentiometer, the inlet valve will close, and the outlet valve will open. This continues dispensing material on the output side while filling material on the inlet side. At the point where the inlet side pressure is drawn down to match the output pressure, the direction will reverse. The appropriate valves will open, and the side which was filling begins to dispense.

The dispense pump is fitted with a linear potentiometer with a wiper. Movement of the motor's screw slides the wiper on the potentiometer and communicates the position of the pump piston.



NOTE

The 300cc and 600cc versions of the Dispense Pump operate in the same manner.

FLOW METER

The flow meter is a gear-type positive displacement meter specially designed for paint and will measure flow up to 1900cc per minute. A sensor detects the movement of the inner gears and sends an electronic signal in the form of a pulse to the controller.

Flow Meter Do's:

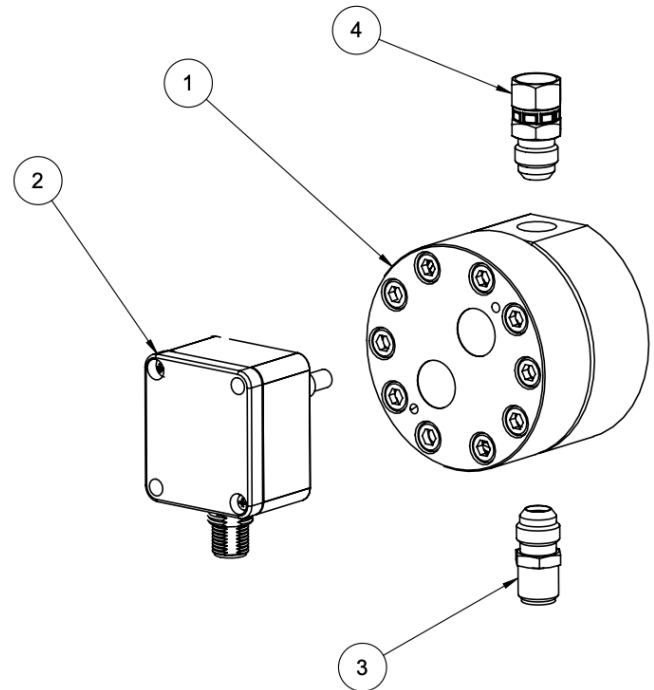
- Filter the paint with a minimum 100 mesh filter. Change filter screens regularly.
- Use pressure regulators upstream from the flow meter to prevent false readings from fluctuating pump pressure spikes.
- Make sure the system is properly grounded and avoid electrical noise at the machine location.
- Calibrate the flow meter cc's/pulse frequently. Even different batches of the same paint can have different flow characteristics.
- Always store the meter filled with solvent.
- The flow meter is mounted to the base of the color stack using a tube fitting. Always remove the tube / nut when removing the flow meter from the fluid panel. Leave inlet and outlet fittings intact.

Flow Meter Don'ts:

- Never run the meter dry or spin the gears for a prolonged time with air only.
- Never leave the meter to sit / stagnate with air or water inside.
- Never let the meter dangle by the cable
- Never let the meter drop onto the floor

Flow Meter Calibration

Perform flow meter calibration regularly as described on the next page. The A+B calibration will verify ratio and flow meter calibration in one simple operation.



Flow Meter Calibration

For the best accuracy in ratio performance of the RM2, it is necessary to calibrate the flowmeter per the material that is being used.

The calibration menu can be reached through the recipe menu and allows a quick check of the material volume dispensed versus what is calculated.

The currently loaded recipe is indicated at the top right of this popup-menu.

In 'A' calibration mode—the pump will not cycle—only resin material will flow when the gun is triggered. Press and hold 'Reset' and the pulse count will be set to zero. Next trigger the gun into a measuring cup and enter the measured volume. The pulse count and expected volume will be compared to the measured volume and will suggest a calculated PPL (pulses-per-liter) calibration value for the flow meter. Pressing 'Save' will save this value to the recipe of the material that is currently loaded.

In 'A+B' calibration mode, the pump will operate and the measured volume will include both A and B materials according to the ratio.

If there is a problem with the catalyst pump, it will be detectable if the A+B volume is consistently incorrect, while the A volume is consistently correct.

The screenshot displays the 'Flow Meter Calibration' interface for recipe '1'. It features two sections: 'A' and 'A+B'.

Mode A:

- Pulse Count: 1578
- Expected Volume (cc): 35
- Calculated PPL: 44830
- Measured Volume (cc): 44

Mode A+B:

- Effective Ratio (A/B): 5.00 : 1
- Pulse Count: 1578
- Expected Volume (cc): 42
- Calculated PPL: 44830
- Measured Volume (cc): 44

Both modes include a 'Reset' button (with a note: 'Press and hold reset button to reset Pulse Count') and a 'Save' button (with a note: 'Saves cc/Pulse to recipe'). A 'Close' button is located at the bottom of the screen.

NOTE

While calibration is active, the atomizing air to the gun will be disabled

NOTE

A different calibration dialog may open based on the flowmeter type (square wave, or 4-20mA)

MAINTENANCE, TROUBLESHOOTING & SPARE PARTS

ALARM TROUBLESHOOTING

System alarms are used to alert the user to conditions which may result in off-ratio spraying or fluid pressure out of range. Refer to the table below to troubleshoot RM2 alarms. Troubleshooting suggestions are listed in order of difficulty with the easier solutions presented first.

If at any time the alarm issue cannot be immediately corrected, the fault may be temporarily disabled until the problem can be resolved. Alarms should never be left disabled.

Alarm Message	Alarm Condition(s)	Action(s)
Low Inlet Pressure	B Pump inlet pressure is below the set limit during operation	Confirm B supply valve is open
		Confirm B supply pressure is correct and matches Home screen reading
		Confirm B supply material is present
		Check Minimum Inlet Pressure setting on System Settings screen
		Confirm valves B1 - B4 are functioning properly
		Confirm solenoids B1 - B4 are functioning properly
		Confirm B Pump pressure transducers are functioning properly
High Outlet Pressure	B Pump outlet pressure is above the set limit at anytime	Trigger spray applicator to relieve pressure
		Confirm main air inlet pressure into RM2 is 75-100 PSI (5-7 bar)
		Confirm valves B1 - B4 are functioning properly
		Confirm solenoids B1 - B4 are functioning properly
		Check for restrictions leading to Mix Manifold
		Confirm A supply pressure is below Maximum Outlet Pressure on System Settings screen
		Confirm B supply pressure is below Maximum Outlet Pressure on System Settings screen
		Remove and Inspect Static Mixer
		Remove and inspect Mix Manifold components
		Confirm B Pump pressure transducers are functioning properly
Ratio Error	Measured A:B ratio is outside of	Check for air in the A supply line
		Check for air in the B supply line
	Note: This occurs only during 'ratio check' mode	Confirm valves B1 - B4 are functioning properly
		Coating flow rate too high
		Adjust Ratio Tolerance in Ratio screen. (Increase as needed or perform a Resin + Hardener calibration)
Resin Flow Error	Component A flow sensed when system not in spraying	Confirm valve AE (Resin Enable) is closed
		Check valve AE for leaks
		Confirm flow meter is not detecting pulses
		Confirm fluid panel is not vibrating
No Hardener Flow	No flow is detected through B pump flow sensor when B pump is running	Confirm B supply valve is open
		Confirm B pressure in the supply line
		Confirm B material in the supply line
		Check connection of flow transducer cable
		Confirm valves B1-B4 are functioning properly - opposite valves should be open (B1&B3 or B2&B4)
		Confirm solenoids B1-B4 are functioning properly
		B flow sensor out of adjustment - See flow sensor calibration procedure in manual

Alarm Message	Alarm Condition(s)	Action(s)
Upper Transducer Fault	Improper electrical signal from upper pressure transducer on B	Check electrical connection and wiring Confirm upper pressure transducer on B pump is functioning properly
Lower Transducer Fault	Improper electrical signal from lower pressure transducer on B	Check electrical connection and wiring Confirm upper pressure transducer on B pump is functioning properly
Check Pump	B pump movement does not match potentiometer output	Check for air in all fluid lines Confirm valves B1-B4 are functioning properly - opposite valves should be open (B1&B3 or B2&B4) Confirm solenoids B1-B4 are functioning properly Perform a calibration (pump-setup) procedure Inadequate B pump inlet pressure - Increase to 5-10% greater than outlet pressure A side material flow rate to high Confirm wiper is properly engaged with potentiometer (check diagnostic screen)
No Resin Flow	Atomization air flow detected with no fluid flow	Confirm no air leaks including spray applicator, air flow switch, and air hoses Confirm blow off time has not been exceeded Confirm valve AE opens when the spray gun is triggered Check connections on flow meter Check solenoid AE Check for stuck flow meter gears Check for low component A pressures - Check A supply pressures and regulators are working properly
Upper Balancing Fault	B pump top fluid pressure not balanced at pump direction change	Air in top of B pump -if air is present perform a component B prime Excessive B pump inlet pressure - reduce to 5-10% greater than outlet pressure Inadequate B pump inlet pressure - increase to 5-10% greater than outlet pressure Confirm pressure transducers are functioning properly
Lower Balancing Fault	B pump bottom fluid pressure not balanced at pump direction change	Air in bottom of B pump -if air is present perform a component B prime Excessive B pump inlet pressure - reduce to 5-10% greater than outlet pressure Inadequate B pump inlet pressure - increase to 5-10% greater than outlet pressure Confirm pressure transducers are functioning properly
Pot Life	Mixed material programmed pot life timer expired	If possible spray out load volume of material in line Flush mixed material from fluid lines with solvent

Alarm Message	Alarm Condition(s)	Action(s)
Color Change Fault	Color change sequence has been interrupted	Confirm stop button was not pressed
		Confirm atomization air is not detected during color change
		If equipped - Confirm applicator(s) are in gun flush box(s) and lid(s) are closed
		If equipped - Confirm proper operation of gun flush box(s)
High Resin Flow Rate	Component A flow rate above set limit during operation	Check for air in fluid lines to color stack valves
		Confirm no leaks in fluid lines
		Verify max resin flow rate in System Settings
		Adjust fluid pressure/flow to color stack valves to ensure limit is not exceeded
Component B Flow Fault	Component B flow detected without pump operation	Check component B supply for fluid leaks
		Confirm component B supply valve is open and supply adequate
		Confirm component B pressure is correct
		Adjust flow sensor so display returns to red signal after spray applicator stops triggering
		Adjust flow sensor at minimum flow rate so display moves off red signal
		Confirm valves B1-B4 are functioning properly - opposite valves should be open (B1&B3 or B2&B4)
Air Flow Detected	Atomization air detected during color change or flush mode	Turn off atomization air during color change or flush
		Check operation of Air Flow Switch(s)
		If equipped - check operation of Gun Flush Box(s)
		If equipped - verify operation of Air Cut Off Valve(s)
EtherCAT Error	An internal error has occurred with PLC communications to the I/O	Cycle Power to the RM2.
		Check cabling between HMI and I/O block.
Emergency Stop Button Pressed	Emergency stop button pressed	Pull out emergency stop button on front of machine
		Press reset button on operator panel
Pump Position Sensor Error	Invalid reading from the pump position sensor.	Check sensor for proper operation.
Max System Pressure Error	Pressure has been measured that is higher than the rated system pressure.	Check that there are no restrictions after the outlet of the catalyst pump that are blocking fluid flow.
		Check atomizing air flow-switches to ensure they are not reading erroneously.
		Check that there are no leaks in the resin material circuit that would be causing flow to be detected.
		Verify that the maximum system pressure settings in the system configuration are correct.

B PUMP TROUBLESHOOTING

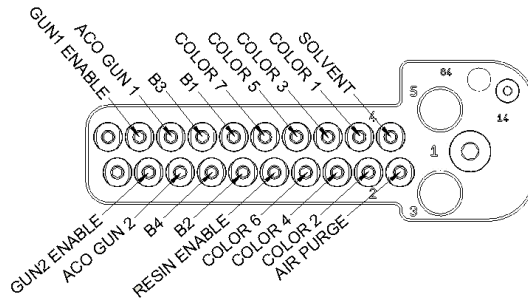
Use this checklist to help identify potential problems with the B pump - avoid unnecessary disassembly. If the problem is still not corrected, it may be necessary to remove the B Pump and clean it thoroughly after flushing it with a solvent. Look for clogged passageways and evidence of fluid leaks.

Description	Pass/Fail
Check that the system is not in an Alarm state. It is possible an Alarm is not allowing the pump to run.	<input type="checkbox"/>
Verify there are no leaks anywhere on the pump fluid end.	<input type="checkbox"/>
Examine the Oil Reservoir. Look for overflowing or hints of hardener / catalyst material in the reservoir.	<input type="checkbox"/>
Check for air in all fluid lines. There must be no air bubbles anywhere	<input type="checkbox"/>
Visually inspect the threaded actuator rod; look for wear or damage. Check rod for adequate lubrication.	<input type="checkbox"/>
Verify the ball plunger is properly contacting the linear potentiometer. Do this by observing the center value change on the Dispense Pump Limits screen during Jog Up or Jog Down movement.	<input type="checkbox"/>
Go to the PRIME screen. Trigger the gun and B Pump. Confirm valve operation, look for a constant stream of material exiting the gun.	<input type="checkbox"/>
Examine the stepper motor. Verify smooth operation when the pump is running. There should not be any 'stuttering' movement of the pump. Unusual movement could be attributed to a flow meter that needs cleaning.	<input type="checkbox"/>
Verify Signal 1A and Signal 1B (Top two LEDs on rightmost card of I/O block) light up and flash when resin material is travelling through the unit.	<input type="checkbox"/>

POWER OUTAGE CLEANING PROCEDURE

In the event of a facility power outage RM2 can be cleared of mixed material manually if air pressure supply continues. If the fluid lines are not cleared, it is possible that the mix manifold, downstream fluid lines, and spray gun may become clogged with hardened material. Valves may be manually triggered to open passageways in the unit. Trigger the gun into a grounded waste receptacle. For systems with gun flush boxes add TRG1 and TRG2 solenoid, or remove the gun from the box for flushing.

Pressing up on the blue manual solenoid triggers will open the corresponding CCV if there is enough residual air pressure available. With the aid of a helper, open CCVs per the references below while triggering the gun.



Solenoid Connection Reference

Use the reference below to reconnect the solenoid air lines to their bulkheads and CCVs. Units that are not fully optioned may not have all 15 solenoids.

Solenoid #/CCV	Location	Description	Basic	Optioned
B1	B Pump	Top Inlet	X	
B2	B Pump	Top Outlet	X	
B3	B Pump	Bottom Inlet	X	
B4	B Pump	Bottom Outlet	X	
RESIN ENABLE	Mix Manifold	Resin Enable Valve	X	
AIR PURGE	Color Stack	Air Enable	X	
SOLVENT	Color Stack	Solvent Enable	X	
COLOR 1	Color Stack	Color 1	X	
COLOR 2	Color Stack	Color 2	X	
COLOR 3	Color Stack	Color 3	X	
COLOR 4	Color Stack	Color 4	X	
COLOR 5	Color Stack	Color 5	X	
COLOR 6	Color Stack	Color 6	X	
COLOR 7	Color Stack	Color 7	X	
ACO GUN 1	Flush Box or ACO Valve	Flush Box Trigger (If Flush Box Used) OR Atomizing Air Cutoff for Gun 1	X	
ACO GUN 2	Flush Box or ACO Valve	Flush Box Trigger (If Flush Box Used) OR Atomizing Air Cutoff for Gun 2	X	
GUN1 ENABLE	2-Gun Selector	Enable Gun 1		X
GUN2 ENABLE	2-Gun Selector	Enable Gun 2		X

FLOW METER TROUBLESHOOTING

Flowmeter problems can be caused by improperly filtered fluid. Particulates in the fluid can cause gear binding, resulting in improper signals for the actual flow rate. Maintain the fluid filters according to the instructions from the filter manufacturer. If repeated disassembly and cleaning for removal of solids and particulates occurs, inspect the entire fluid supply system and evaluate the system cleaning cycle.

Fluid back-up, that is, reverse flow, can cause reacted/catalyzed material to enter the flow meter. The flow meter should be cleaned immediately, before the fluid gels or hardens.

Under normal operation the sensors or electrical connections will not require replacement..

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	310-9010	FLOW METER BODY	1
2	310-9011	DUAL PROBE PICKUP	1
3	4-6JIC	FITTING, 1/4" NPS (M) X 3/8" JIC (M)	1
4	4SN-6JIC	FITTING, 1/4" NPS (F) X 3/8" JIC (F)	1

MAINTENANCE PROCEDURES

There are no enclosure components which should require cleaning if the enclosure door is kept shut. If material seepage occurs, be sure to correct the problem and maintain a clean work area. To avoid hardening of the paint inside the fluid lines, the system must be cleaned by a complete flushing procedure at the end of operations. See the Operations Manual 77-2982 for more information regarding flushing.

WARNING

Never expose electrical equipment to flammable liquids or gases including solvent fumes.

Cleaning of Hoses

If gun 1 and gun 2 flush sequences are correct the mixed material line(s) will remain clean and ready for the next use. Always finish spraying operations with a color 0 load that removes all air from the fluid lines. If pot life is greatly exceeded, it is recommended the static mixer and mixed material hose be replaced and the mix manifold disassembled and cleaned.

Maintenance of CCV Valves

If a color change valve has not been used for a prolonged period, it is recommended to remove the valve and clean the fluid passages. Paint material may collect inside the valve or manifold passages. If the valves do not operate properly or if fluid leaks occur the valve must be repaired. Check the valves for proper operation regularly.

Maintenance of Flow Meters

If the flow rate graph or B pump movement appears erratic the, flow meter should be inspected for proper operation. Paint solids may collect in and around the gears, bearings, and shafts, interfering with the motion of the gears and resulting in incorrect flow measurement. The use of abrasive or pigmented fluids will lead to wear which influences the accuracy of the flow meter. Routinely calibrate the flow meter for all paints used with the system. See the Operations Manual 77-2982 for more information

Cleaning The Enclosure Exterior and HMI

The control enclosure's exterior painted surfaces must only be cleaned with a soft damp cloth and household cleaners. Cleaning of the touch-screen-display with solvents is not allowed. If contamination of the display is expected, use disposable screen protectors 240-5143.

WARNING

Read and understand all operating manuals for connected equipment. Failure to properly follow the operating instructions could result in severe injury .

PREVENTIVE MAINTENANCE

The RM2 system requires periodic inspection and regular maintenance. Follow the corresponding table as a guide to perform routine maintenance at suggested intervals. These intervals are recommendations and largely depend on the material being sprayed.

Daily / Each Shift:

- Ensure mixed material is properly flushed at the end of the shift. Verify there are no air pockets in the fluid lines.
- Identify and correct air and fluid leaks on the system including fluid hoses, flow meter, dispense pump, and mix manifold.
- Ensure spray guns are functioning properly and air is not leaking from the air valve.
- Check Alarm History and review errors with operator. Verify issues have been corrected.
- Ensure material supplies are filled and pressures are correct.

Monthly

- Inspect static mixer assembly at mix manifold outlet. If static mix elements become clogged, replace the static mixer as needed. Balancing alarms or increasing outlet pressure may indicate clogging.
- Examine B pump oil reservoir tubes for presence of hardener and proper lubricant level.
- Check all air and fluid lines for kinks, cuts, or wear.
- Perform A+B Calibration to ensure flow meter and dispense pump are working properly.
- Ensure all CCVs are opening and closing properly. Remove valves and clean if needed.
- Clean and reassemble the mix manifold and check valves.
- Check fluid hoses for buildup of material. Replace if needed. With plural component coatings, buildup of material is common around the hose fittings. This is a potential source for contamination on the finished product.

As Needed

- Rebuild mix manifold – replace O-Rings and parts within the injector assembly.
- Clean and reassemble the flow meter.
- Rebuild B pump – required if “B” material begins to leak from the oil reservoirs, or if the A Only Calibration is correct, but the A+B Calibration is inaccurate.
- Rebuild Color Change Valves – monitor valves for air leaks or slow response time when triggering
- Inspect flow meter for excessive wear or buildup of material. Verify smooth dispense pump movement.
- Set limits of B Pump/ perform calibration.

NOTE

Reactive fluid properties vary greatly. If a material clogs any component more frequently than expected, adjust the maintenance schedule accordingly.

REGULAR INSPECTION

Continuous use or lack of use of the system may both lead to system malfunctioning. Please conduct regular inspections to the system according to the frequency table below.

Frequency	Description	Inspection Method
Daily	System flushed with solvent	Visual
Daily	Check for leaks	Visual
Daily	Clean spray guns	Visual
Daily	Check alarm history	Visual
Daily	Check for material supply	Visual
Monthly	Inspect all electrical and mechanical components for degradation due to environmental factors	Visual
Monthly	Check static mixer for clogs	Visual
Monthly	Check all hoses for kinks and wear	Visual
Monthly	Perform flow meter calibration check	Test with beaker
Monthly	Check CCV operation	Disassemble
Monthly	Clean mix manifold and check valves	Disassemble
Monthly	Check fluid hoses for material buildup	Disassemble
As needed	Clean flow meter	Disassemble
As needed	Rebuild color change valves	Disassemble
As needed	Replace static mixer assembly	Disassemble

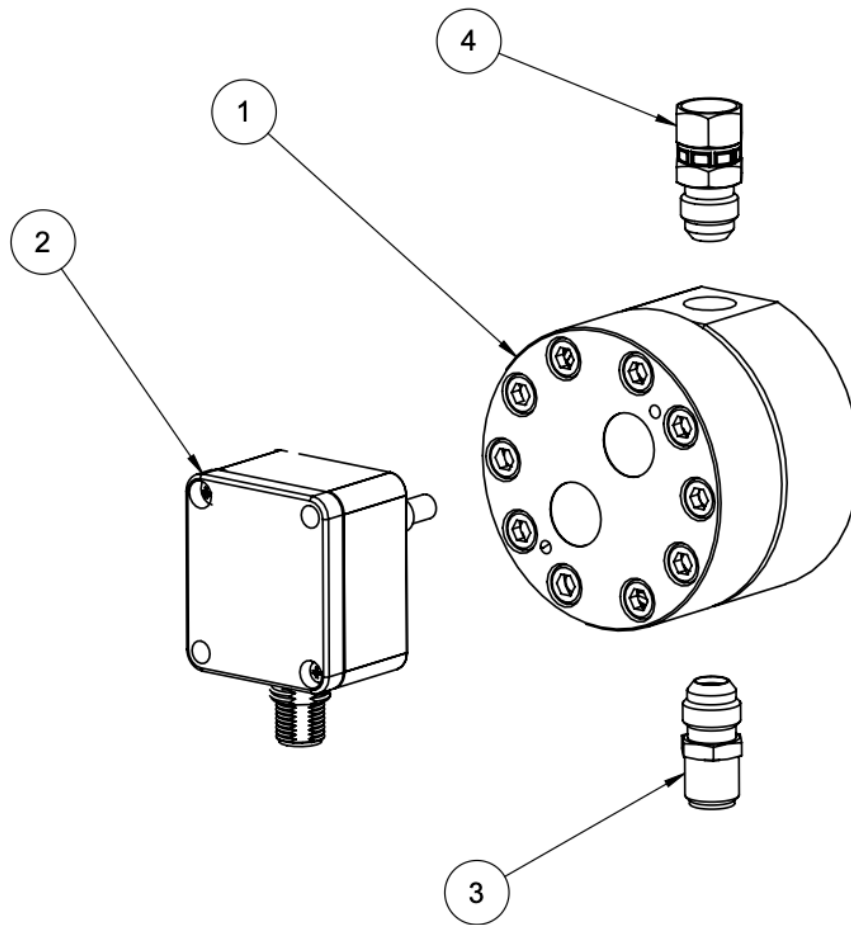
COMPONENT VIEWS & SPARE PARTS

Part Number	Description	Recommended Qty
1414-SS-90-T	Fitting, 3/8 ODT x 1/4 NPS, 90	2
240-3122-300	Static Mix Assembly, 300cc	1
240-3122-600	Static Mix Assembly, 600cc	
240-5136-300	300cc dispense pump	As Desired
240-5136-600	600cc dispense pump	
240-5156	15 PSI PRESSURE SWITCH	1
240-5180	Circuit Breaker, 2A	1
240-5181	Circuit Breaker, 3A	1
240-5185	Safety Relay	1
240-5186	0-500psi pressure sensor	1
240-5187	M12 4-pin to Leads. 2M	1
240-5188	M12 4-pin to Leads. 2M	1
240-5241	Linear Motor Assembly	As Desired
240-5264	ACO Valve Assembly	1
240-5290	JP - cord w/ connector	1
240-5291	NA - cord w/ connector	
240-5292	UK - cord w/ connector	
240-5293	CN - cord w/ connector	
240-5294	EU - cord w/ connector	

Part Number	Description	Recommended Qty
240-5368	Stepper Motor Cable Assembly	As Desired
310-9010	FLOW METER BODY	1
310-9011	DUAL LEG PICKUP	1
6SN-6CV	CHECK VALVE ASSY FOR MIX MANIFOLD	1
77367-00	SEAT ASSEMBLY - MCV	1
78949-00	MCV VALVE ASSEMBLY	2
CCV-503-SS	VALVE ASSEMBLY	1
FEP-0604	Hose, 3/8 ODT x 1/4 ID	50 ft
240-5154	Solenoid Valve	1
240-5141	300cc Pump Rebuild Kit	1
240-5142	600cc Pump Rebuild Kit	
A10756-00	Tool, MCV Removal	1

Flow Meter

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	310-9010	FLOW METER BODY	1
2	310-9011	DUAL PROBE PICKUP	1
3	4-6JIC	FITTING, 1/4" NPS (M) X 3/8" JIC (M)	1
4	4SN-6JIC	FITTING, 1/4" NPS (F) X 3/8" JIC (F)	1



B Pump**300cc**

Part Number	Description	Quantity
0114-016099	Packing Lube, 250ML	1
20-4844	DOWEL PIN, 3/16 DIA X 1/2 LONG, SS	2
237-727	Flat Washer	1
237-729	Retaining Ring	1
240-3211	Rod Seal	2
240-3212-300	Piston Seal, 300CC	2
240-3221	HOLDER,SEAL	1
79001-05	2-010 O-ring, Kalrez	4
79001-09	o-ring, 2-015, solvent proof	1
79001-21	O-RING, 2-020, PERFLUOROELASTOMER	2

600CC

Part Number	Description	Quantity
0114-016099	Packing Lube, 250ML	1
20-4844	DOWEL PIN, 3/16 DIA X 1/2 LONG, SS	2
237-727	Flat Washer	1
237-729	Retaining Ring	1
240-3211	Rod Seal	2
240-3212-600	Piston Seal, 600CC	2
240-3221	HOLDER,SEAL	1
79001-05	2-010 O-ring, Kalrez	4
79001-09	o-ring, 2-015, solvent proof	1
79001-18	O-RING, -027, PERFLUOROELASTOMER	2
79001-21	O-RING, 2-020, PERFLUOROELASTOMER	2

ELECTRICAL DIAGRAMS

Notes:

1. Wire Gauge (Unless Noted)
USE MIN 75 DEGREE C COPPER WIRE

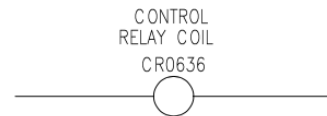
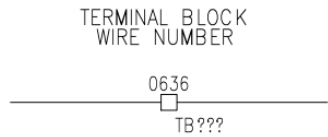
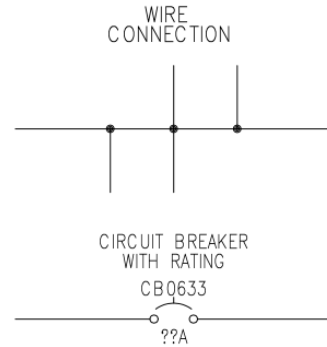
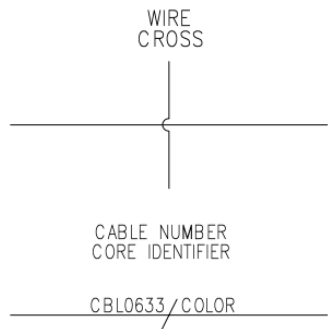
22 AWG	3 AMPS
20 AWG	5 AMPS
18 AWG	7 AMPS
16 AWG	10 AMPS
14 AWG	15 AMPS
12 AWG	20AMPS
10 AWG	30 AMPS
8 AWG	50 AMPS
6 AWG	65 AMPS
4 AWG	85 AMPS
3 AWG	100 AMPS

2. Ferrules to be used on ALL wires.
(Unless Noted)

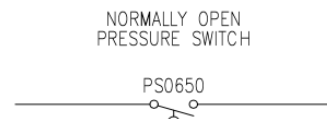
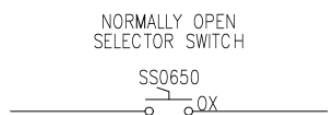
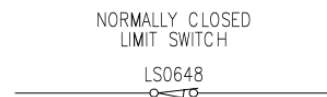
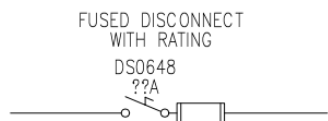
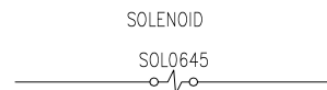
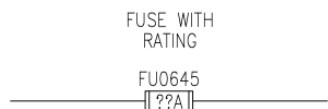
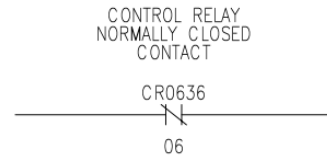
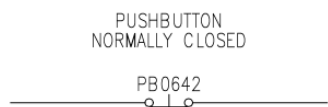
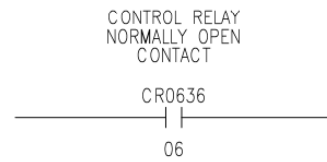
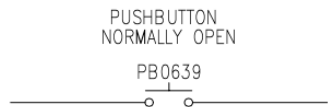
Black - Ungrounded line voltage
Blue - Ungrounded DC voltage
White/Blue - Grounded DC Common
Green/Yellow - Ground

Drawing#	Description
1	Title Page
2-9	Schematic Descriptions
10-29	Power Distribution
30-39	Power Distribution 24VDC
40-49	Machine Control
50-59	Communication/Networking

LEGEND DESCRIPTIONS
NUMBERING CODE
XX???? = COMPONENT TYPE
??XX?? = SHEET
????XX = COLUMN



06
06

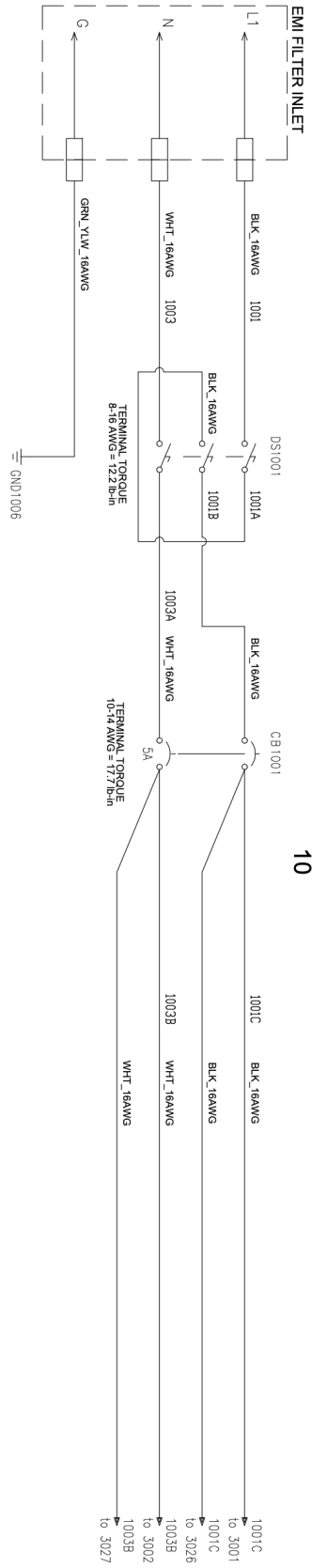


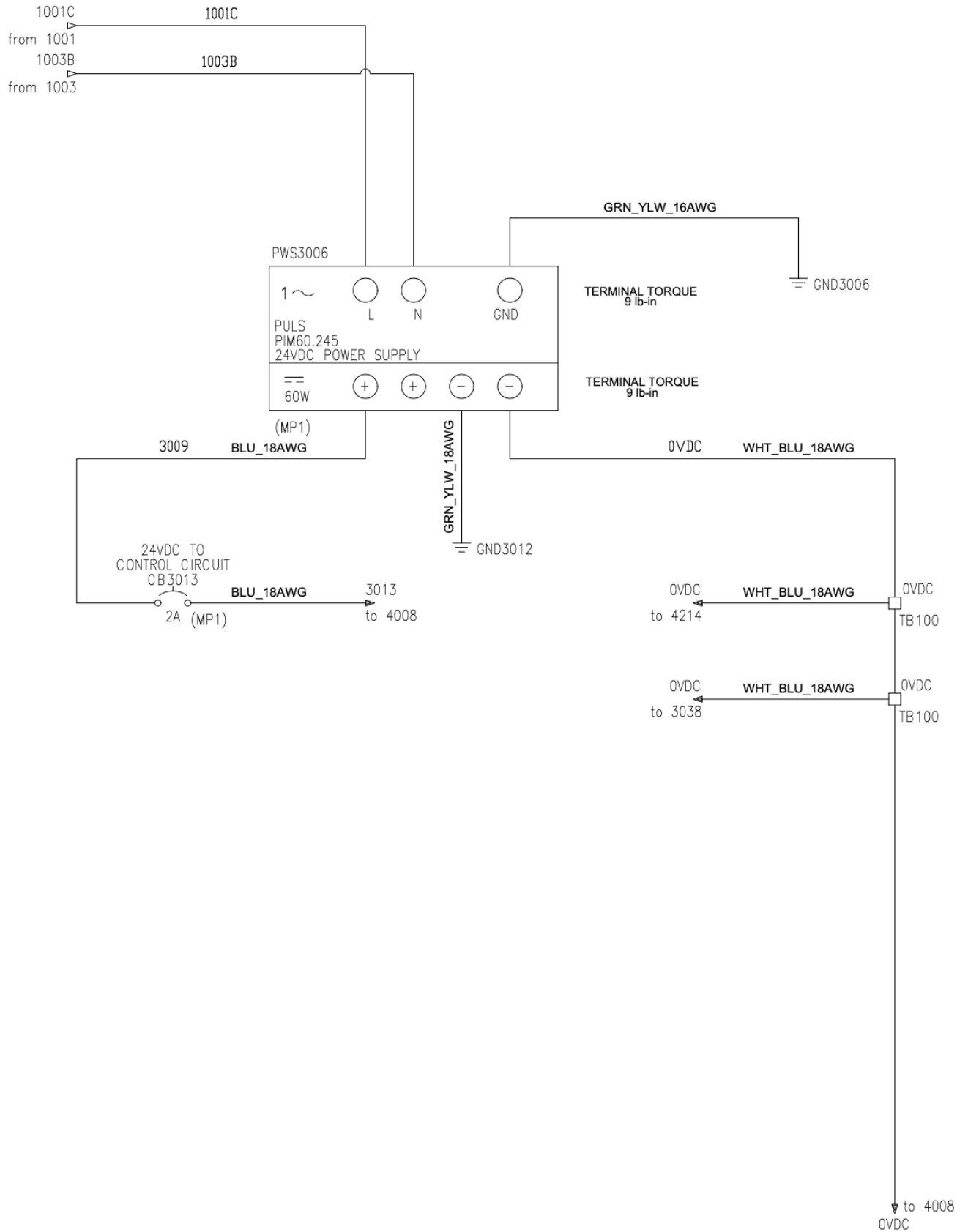
Wire Reference	Color
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WHT	WHITE
BLU	BLUE
RED	RED
GRN	GREEN
ORG	ORANGE
BRN	BROWN
YLW	YELLOW

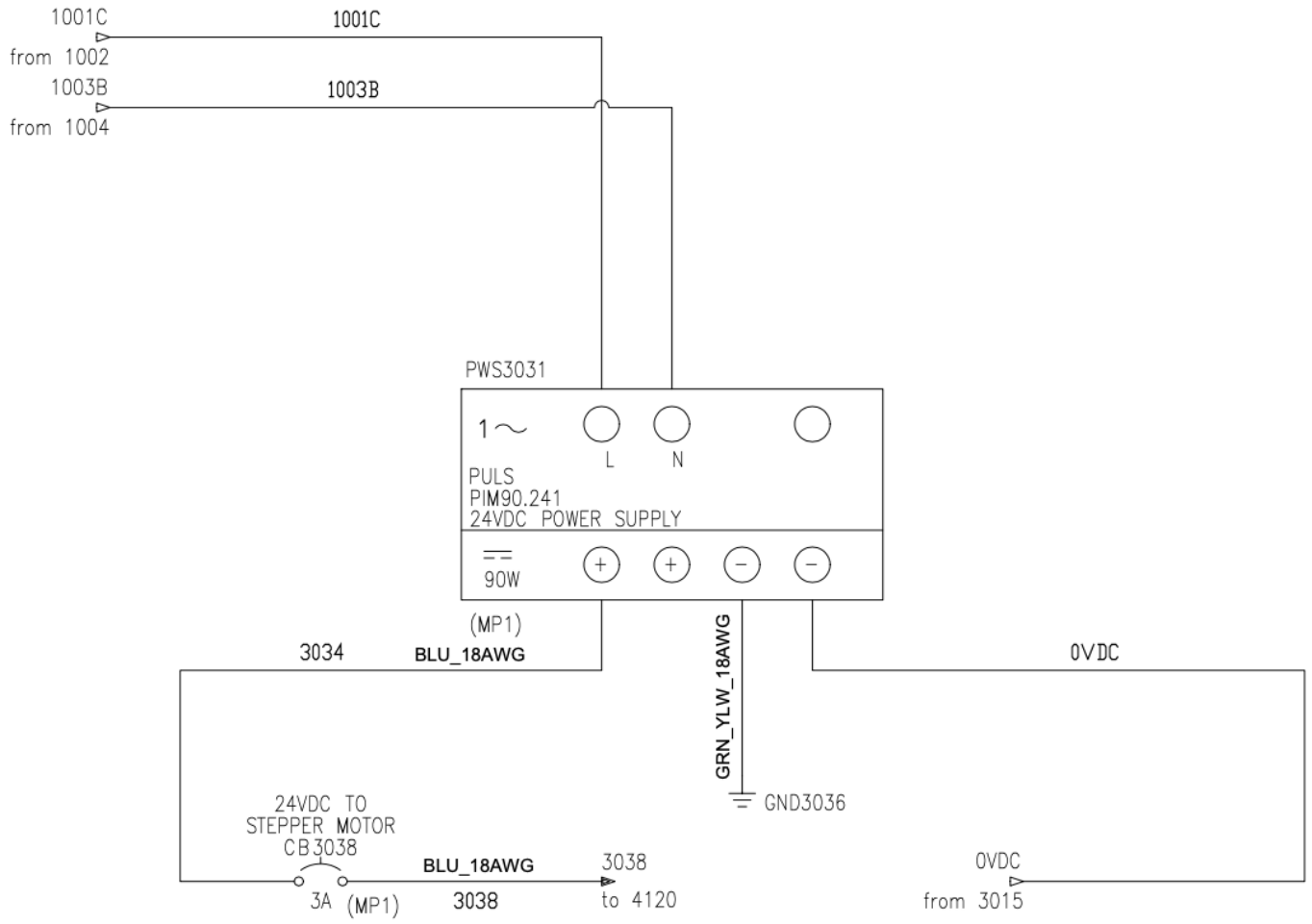
Wire Reference	Color
RED_GRY	RED w/GREY STRIPE
GRY_RED	GRAY w/RED STRIPE
WHT_BRN	WHT w/BROWN STRIPE
BRN_WHT	BROWN w/WHITE STRIPE
WHT_GRY	WHITE w/GREY STRIPE
GRY_WHT	GRY w/WHITE STRIPE
RED_BLU	RED w/BLUE STRIPE
BLU/RED	BLUE w/RED STRIPE
RED/ORG	RED w/ORANGE STRIPE
ORG/RED	ORANGE w/RED STRIPE
RED/GRN	RED w/GREEN STRIPE
GRN_RED	GREEN w/RED STRIPE
BRN_RED	BROWN w/RED STRIPE
RED_BRN	RED w/BROWN STRIPE
WHT_GRN	WHITE w/GREEN STRIPE
GRN_WHT	GREEN w/WHITE STRIPE
WHT_BLU	WHITE w/BLUE STRIPE
BLU_WHT	BLUE w/WHITE STRIPE
WHT_ORG	WHITE w/ORANGE STRIPE
ORG/WHT	ORANGE w/WHITE STRIPE

American Wire Gauge (AWG)	Diameter (Inches)	Cross Sectional Area (mm ²)	Ampacity (75°C Copper)
6	0.162	13.29	65
8	0.1285	8.36	50
10	0.1019	5.26	30
12	0.0808	3.31	20
14	0.0641	2.08	15
16	0.0508	1.31	10
18	0.0403	0.82	7
20	0.032	0.52	5
22	0.0254	0.33	3

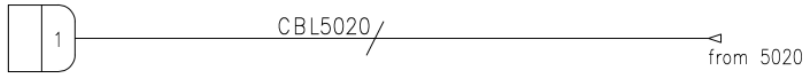
CABLE NUMBER	CABLE TYPE	PART NUMBER
CBL4004	CAT6	
CBL4208	FACTORY CABLE	
CBL4211	FACTORY CABLE	
CBL4214	M12	
CBL4302	FACTORY CABLE	
CBL4408	FACTORY CABLE	240-5222
CBL4420	FACTORY CABLE	
CBL4502	ASSEMBLY	
CBL4511	BULK CBL	
CBL4517	FACTORY CABLE	240-5187
CBL4520	FACTORY CABLE	240-5187
CBL4602	FACTORY CABLE	240-5188
CBL4610	FACTORY CABLE	240-5188
CBL5007	CAT6	
CBL5020	CAT6	
CBL5518	CAT6	



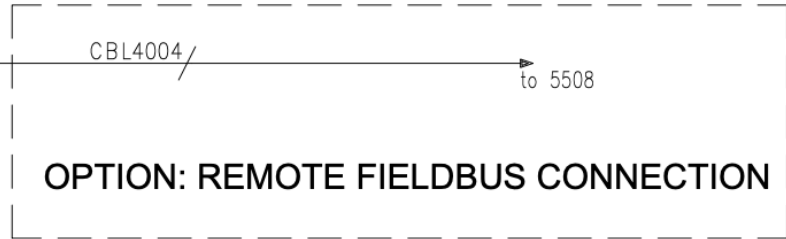
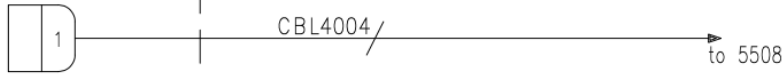




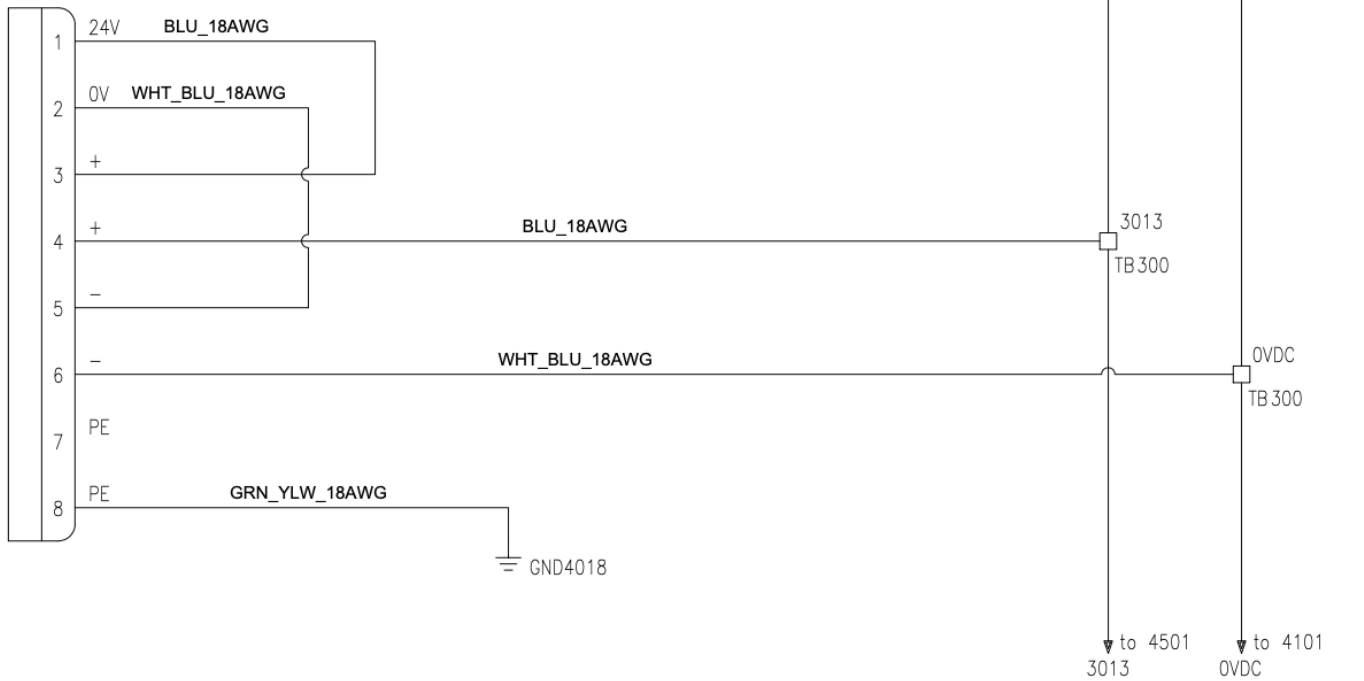
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SIGNAL INPUT ETHERCAT
PL4001

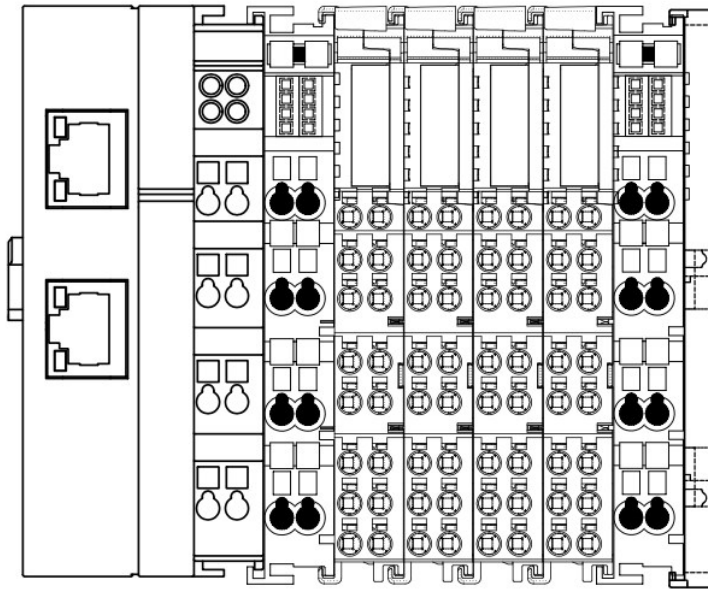


LINK/ACT OUT
SIGNAL OUTPUT ETHERCAT
PL4004

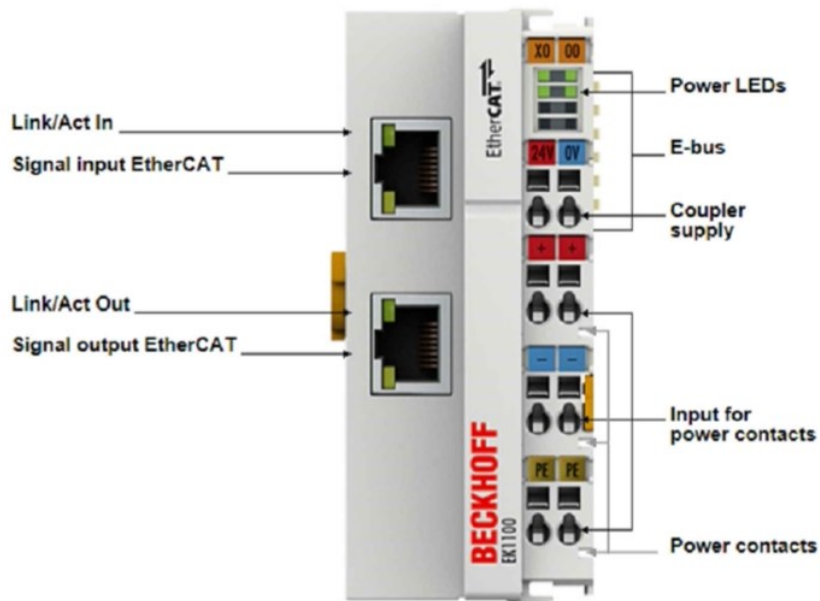


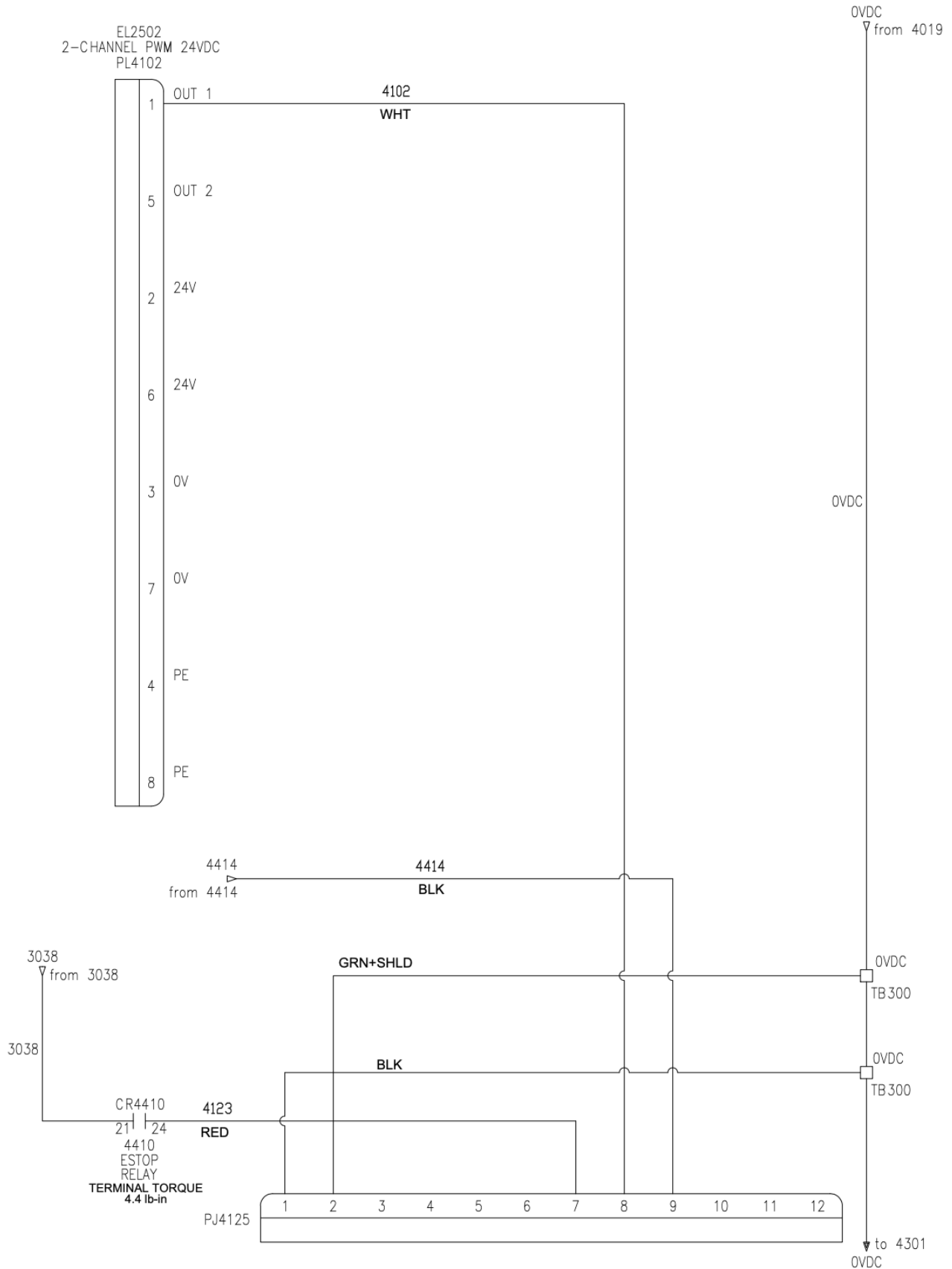
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ETHERCAT COUPLER
PL4010

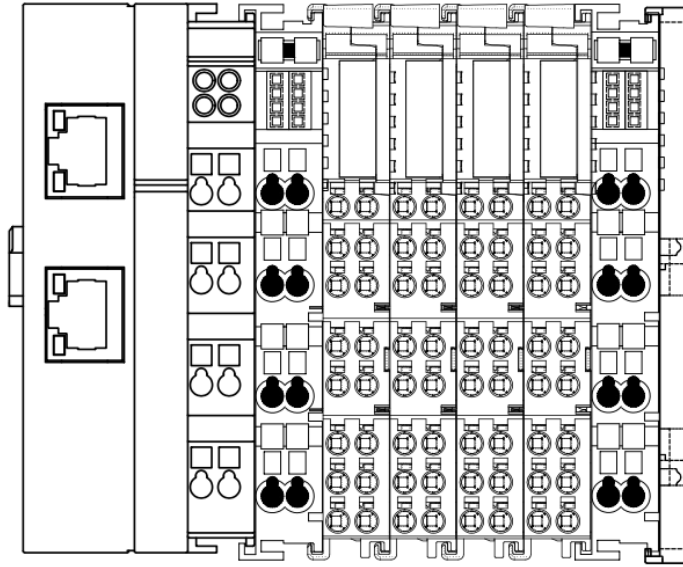




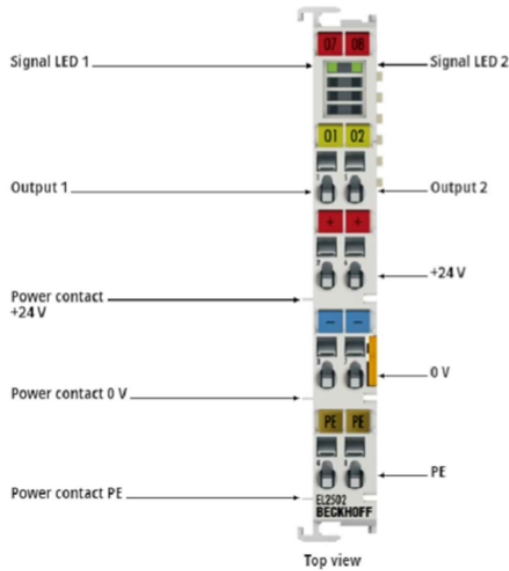
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EL2502
EL1808
EL2809
EL2809
EL3174
EL5152





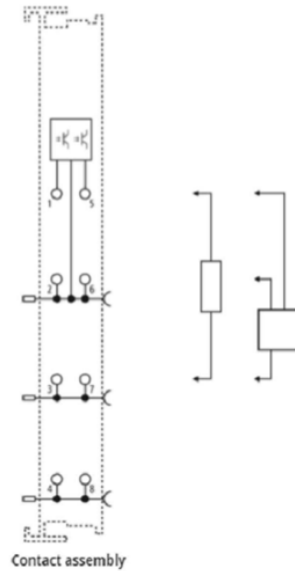


EK1100
EL2502
EL1808
EL2809
EL2809
EL3174
EL5152



Top view

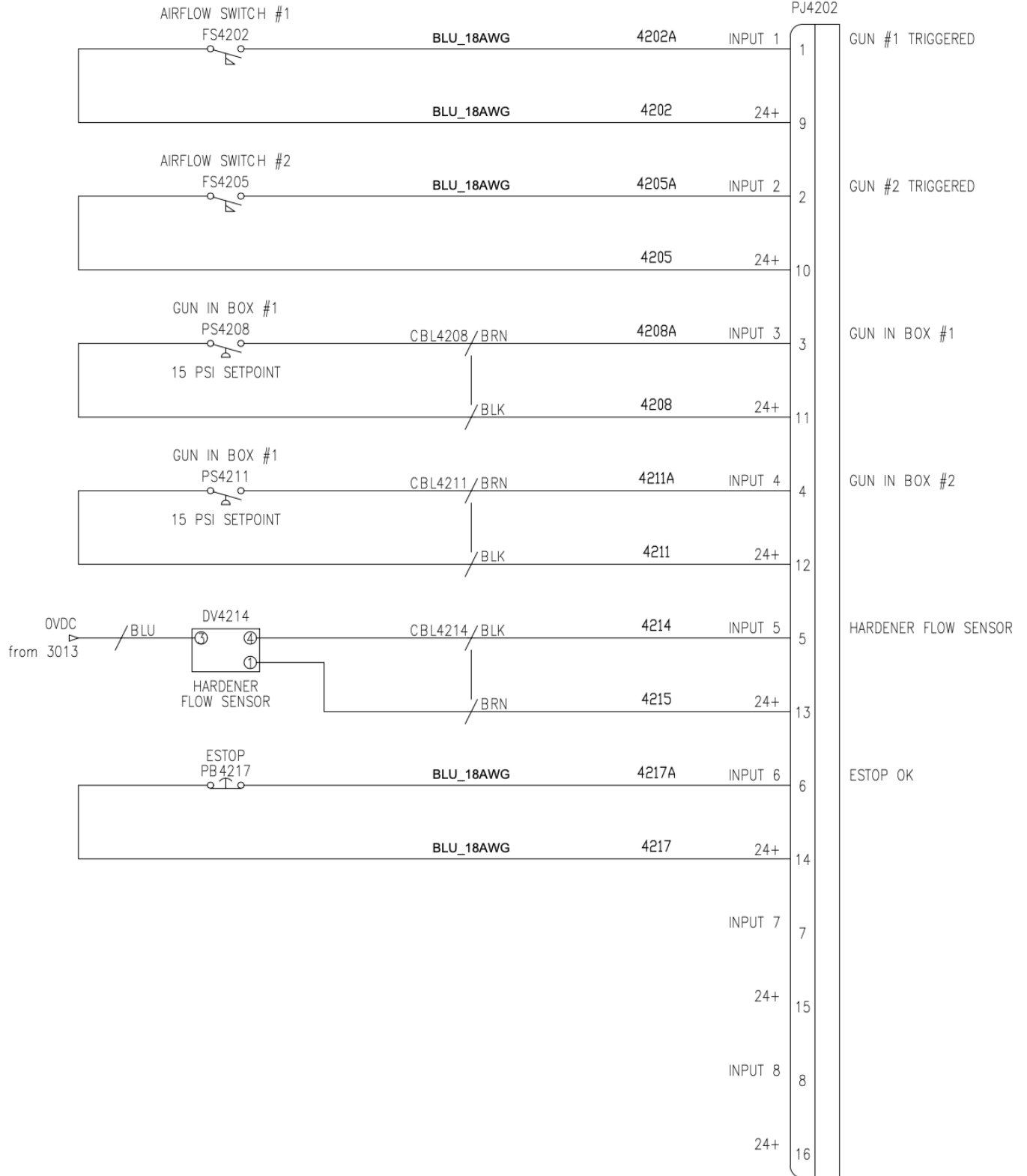
Top view

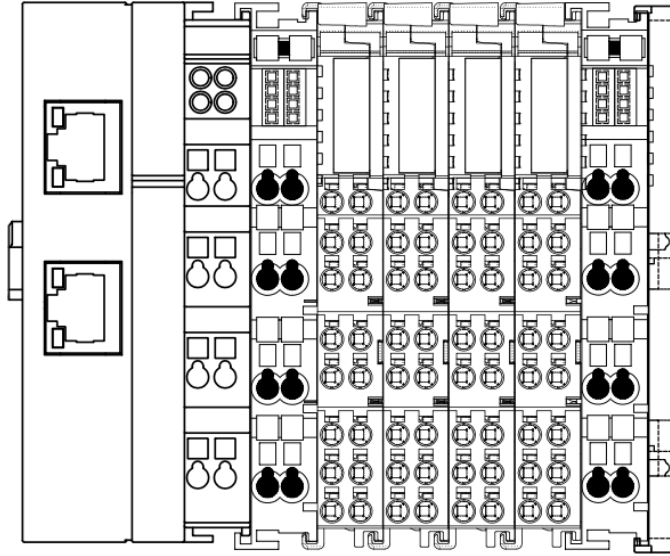


Contact assembly

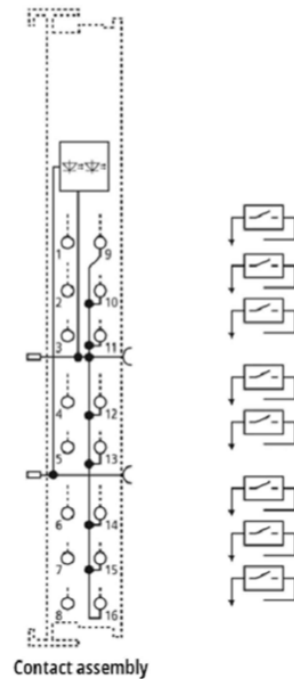
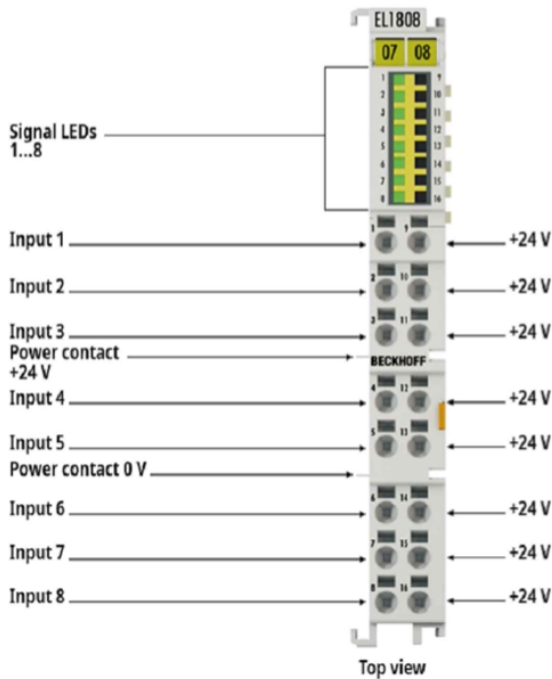
Contact assembly

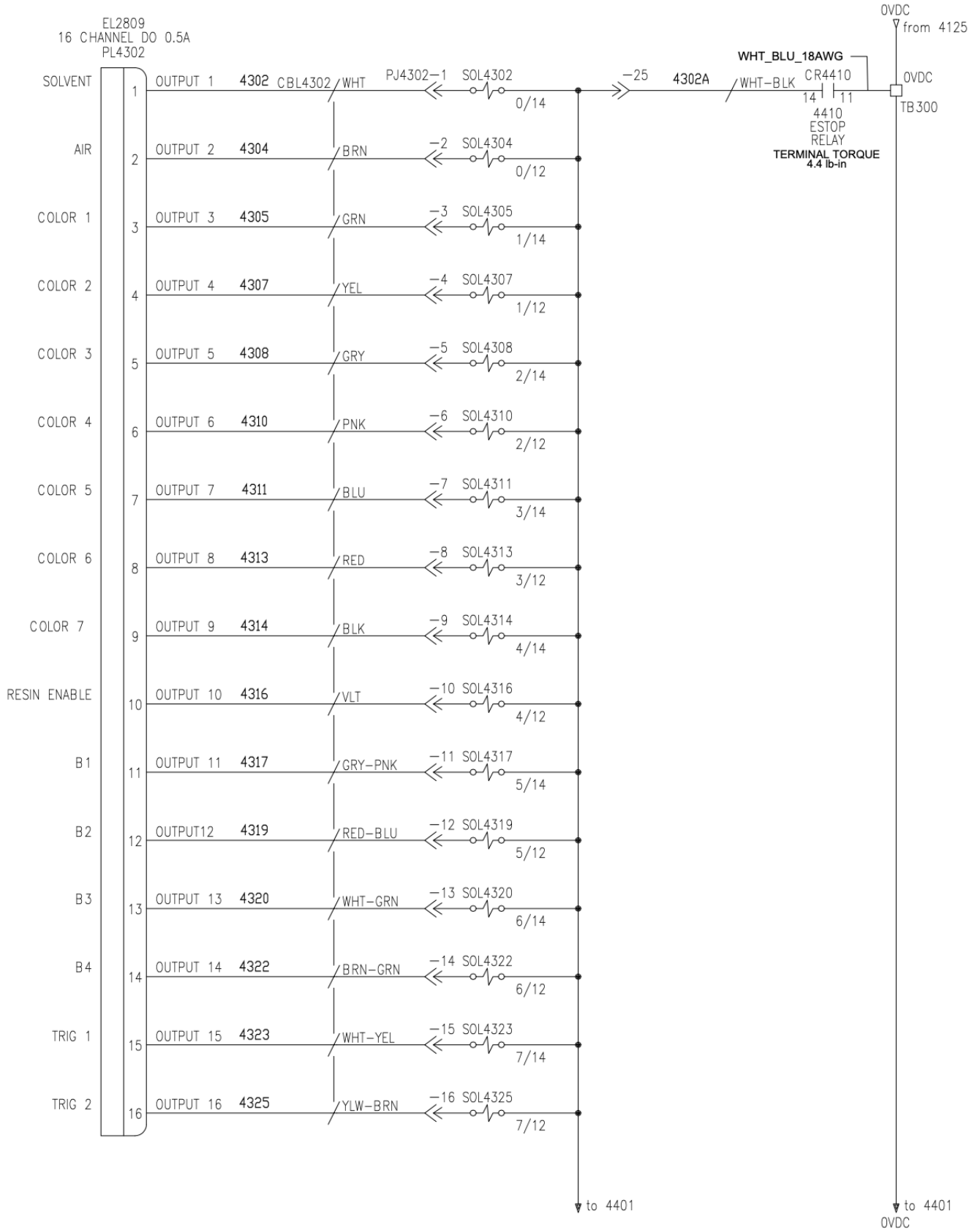
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8-CHANNEL DI
2-WIRE CONNECTION
PJ4202

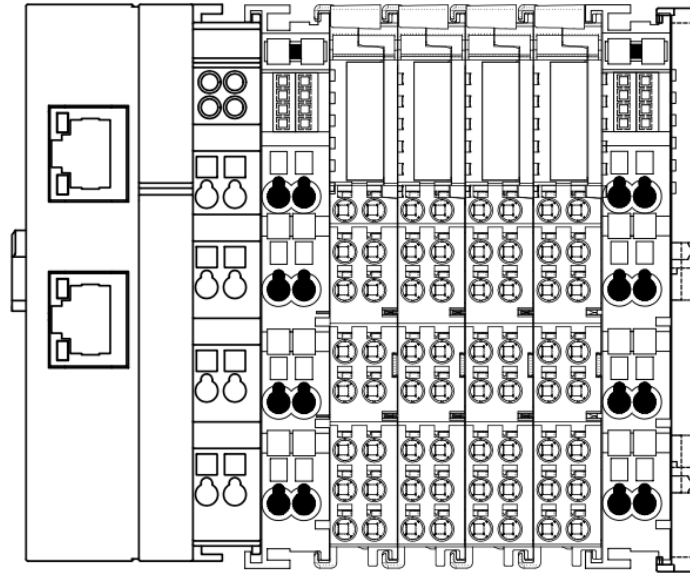




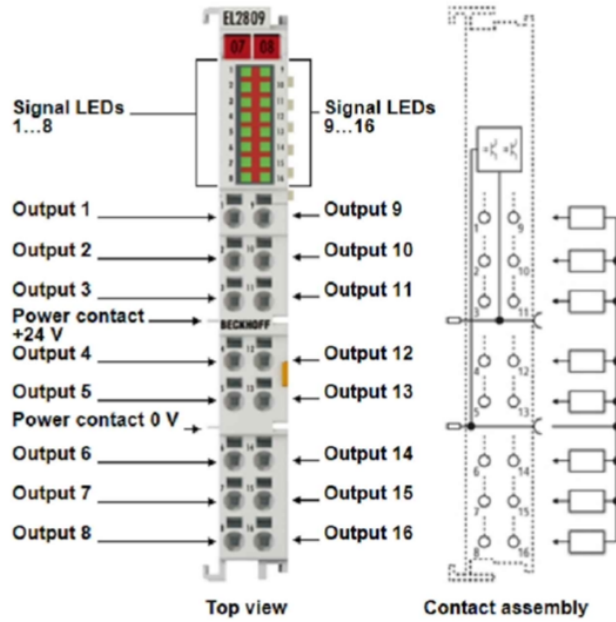
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 EL2502
 EL1808
 EL2809
 EL2809
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 EL5152

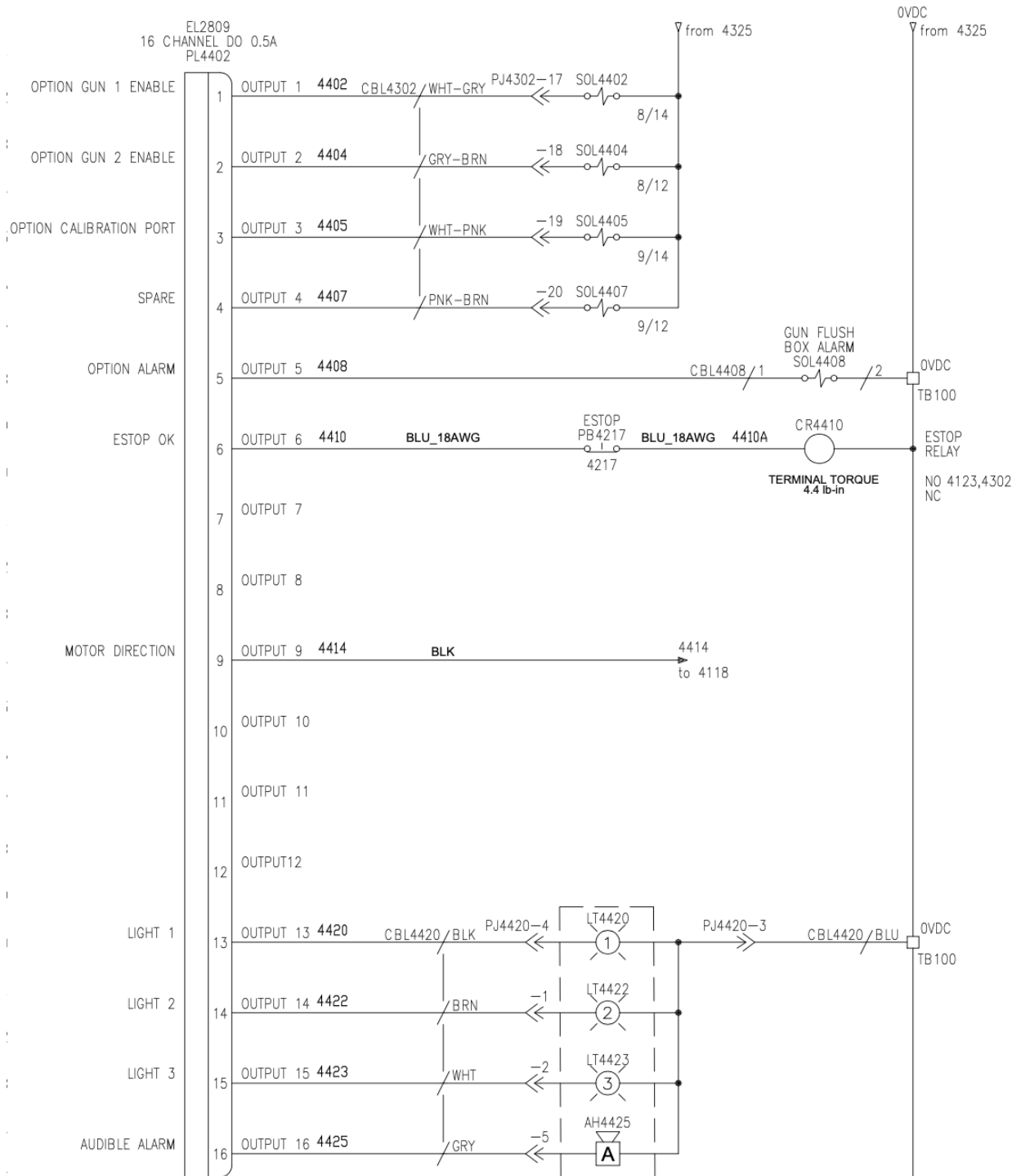






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EL2809
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EL3174
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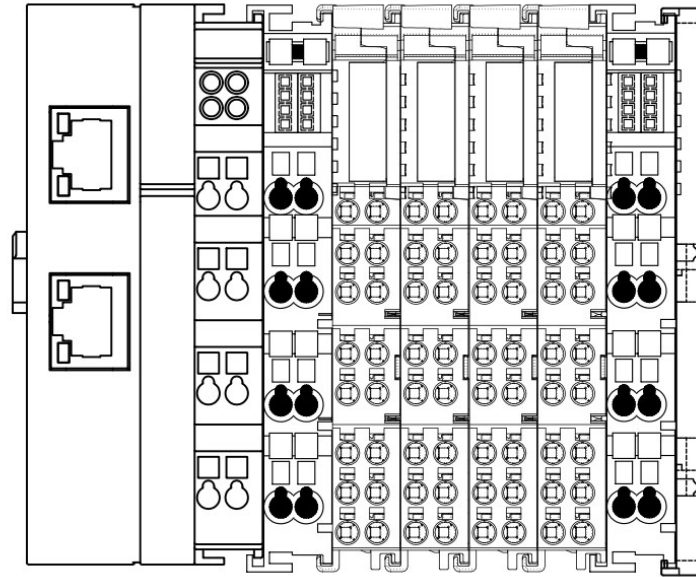




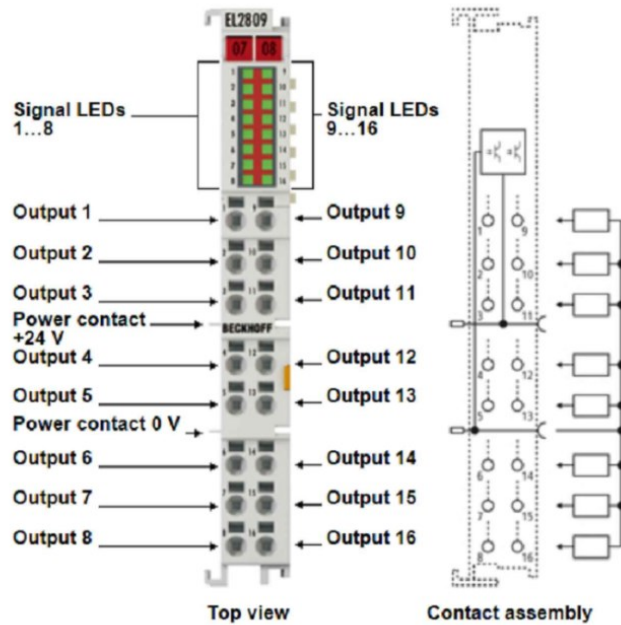
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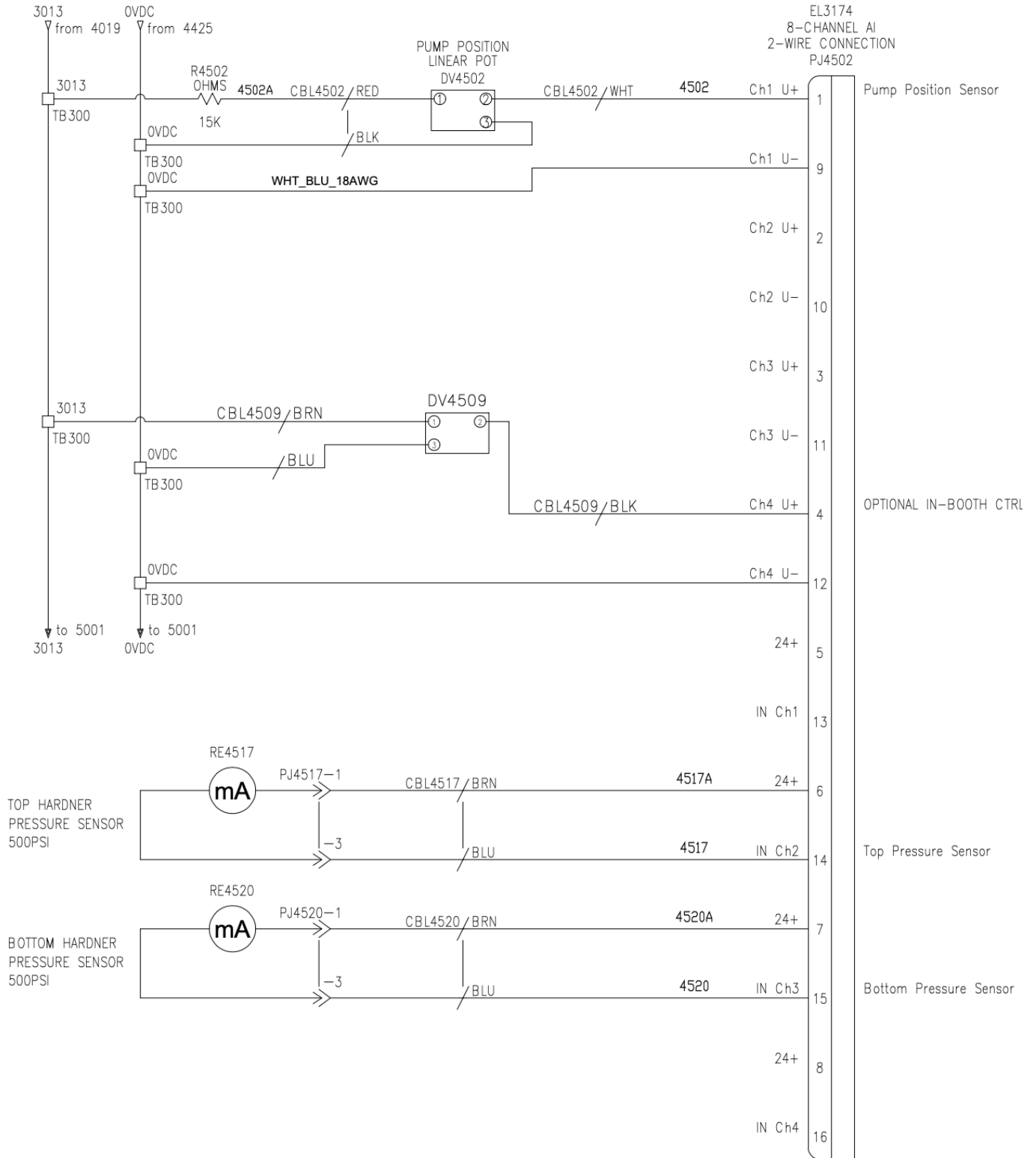
NOTE: 1 Color Chart

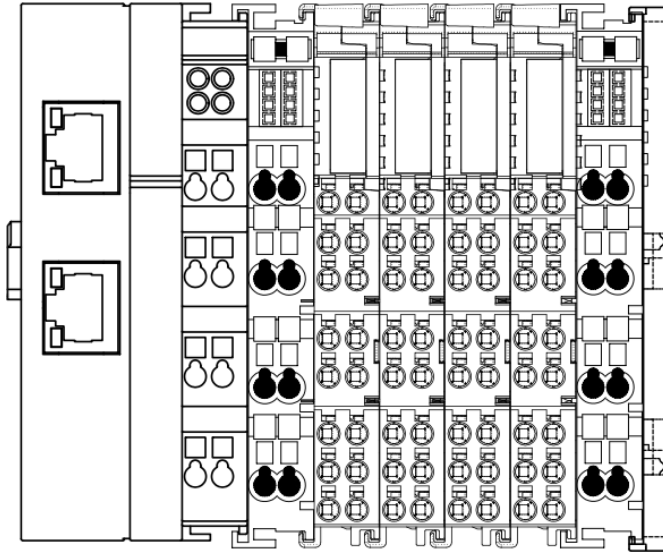
	Red	Yellow	Green	Cyan	Blue	Magenta	White
Input 1	X	X				X	X
Input 2		X	X	X			X
Input 3				X	X	X	X



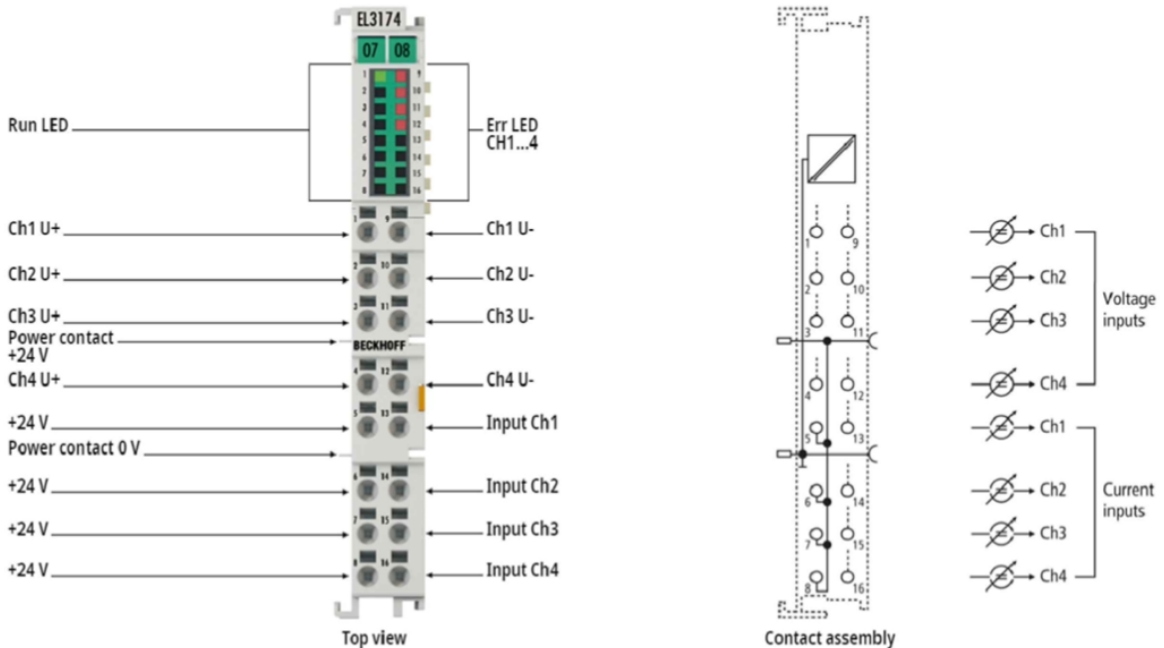
EK1100
EL2502
EL1808
EL2809
EL2809
EL3174
EL5152



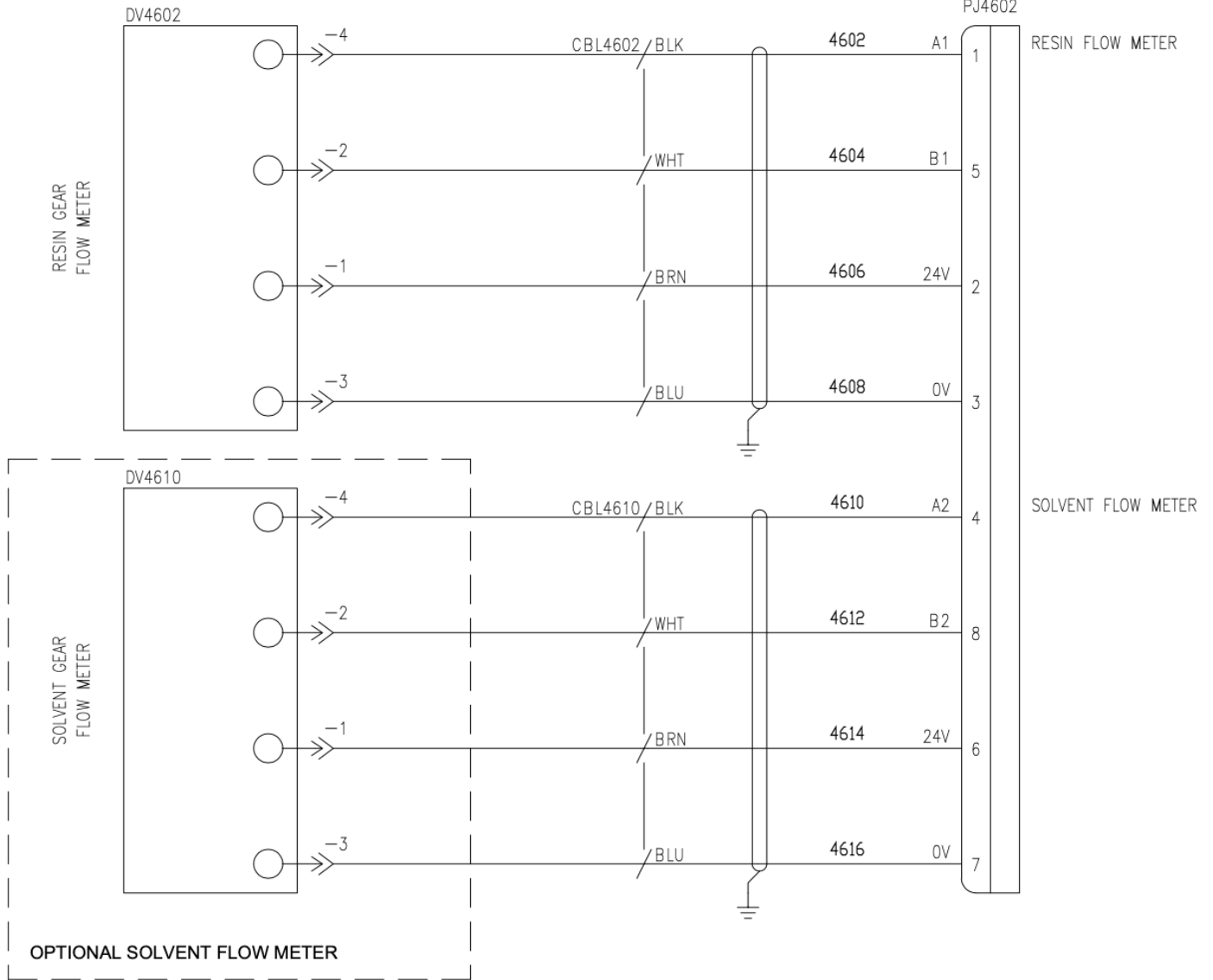




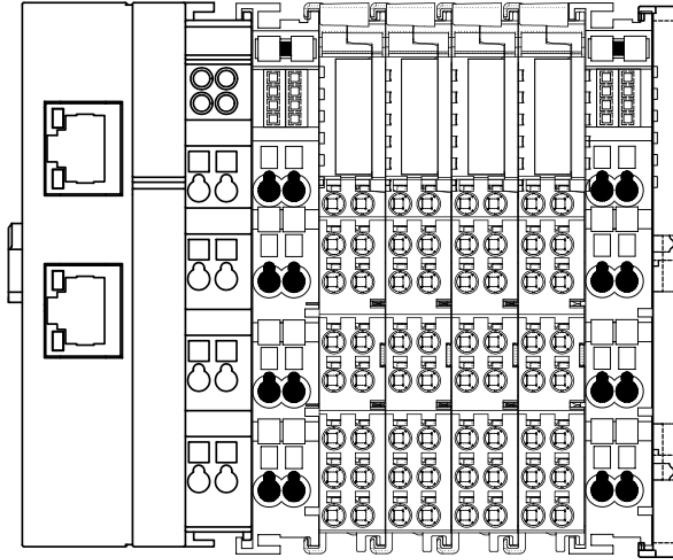
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EL1808
EL2809
EL2809
EL3174
EL5152



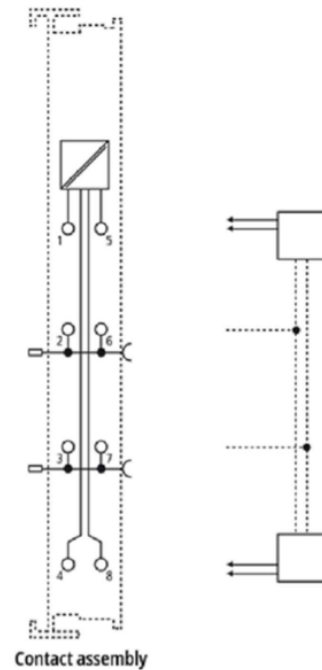
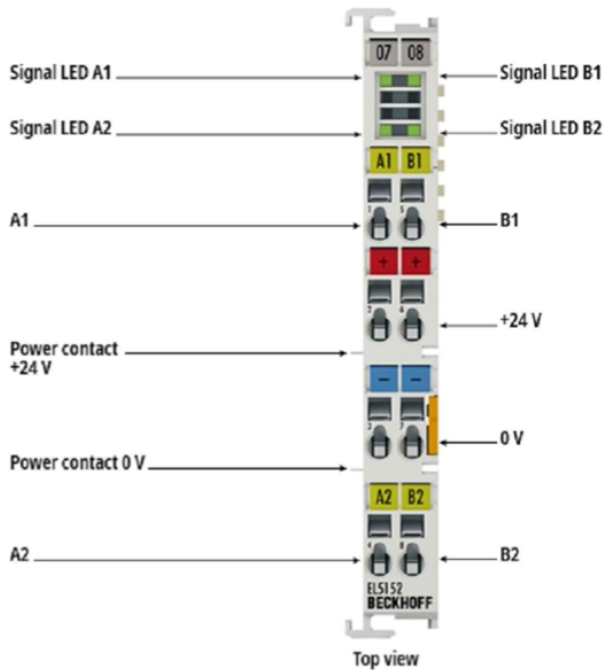
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 INCREMENTAL ENCODER
 2 CHANNEL. 24V, 100 KHZ
 PJ4602

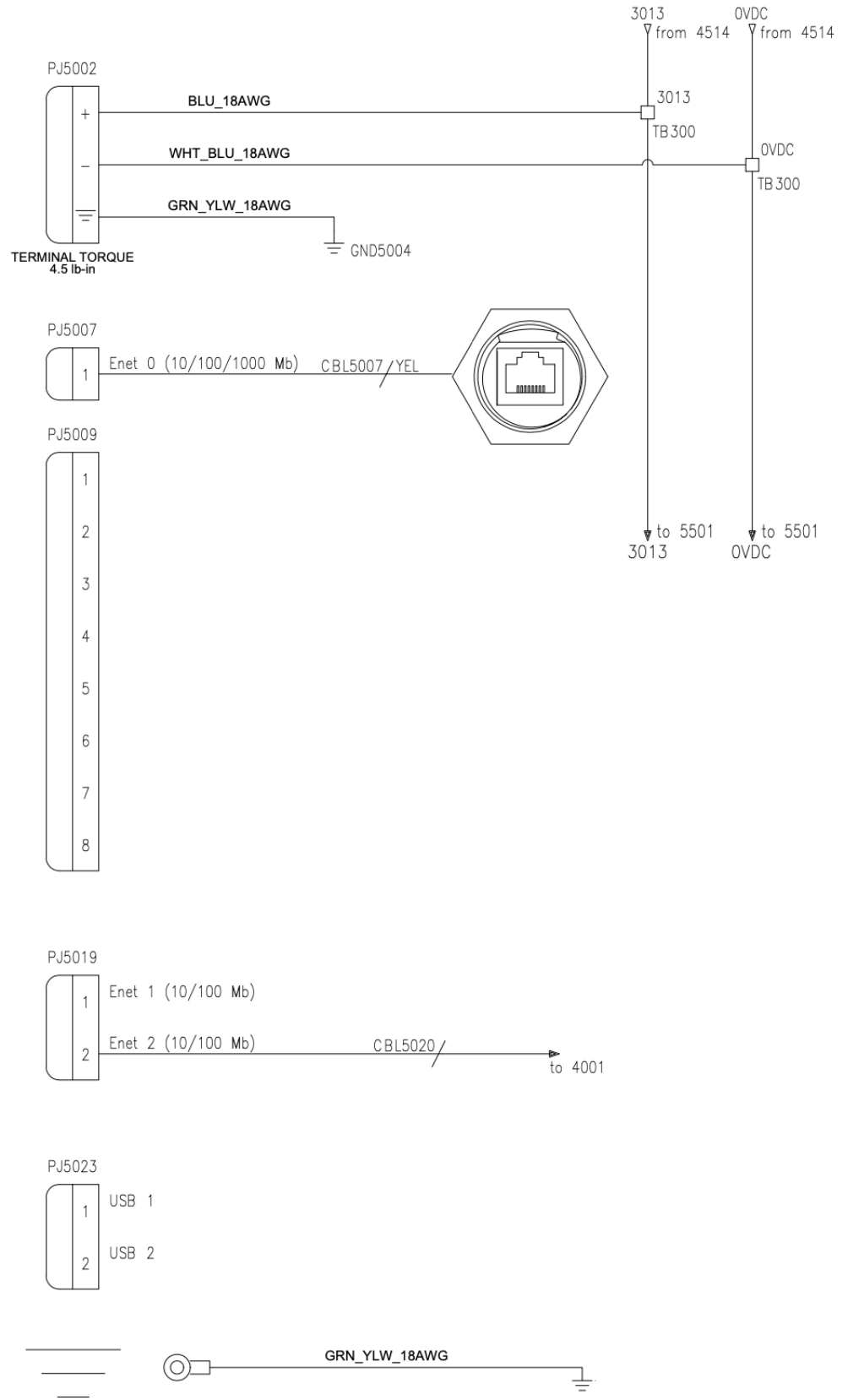
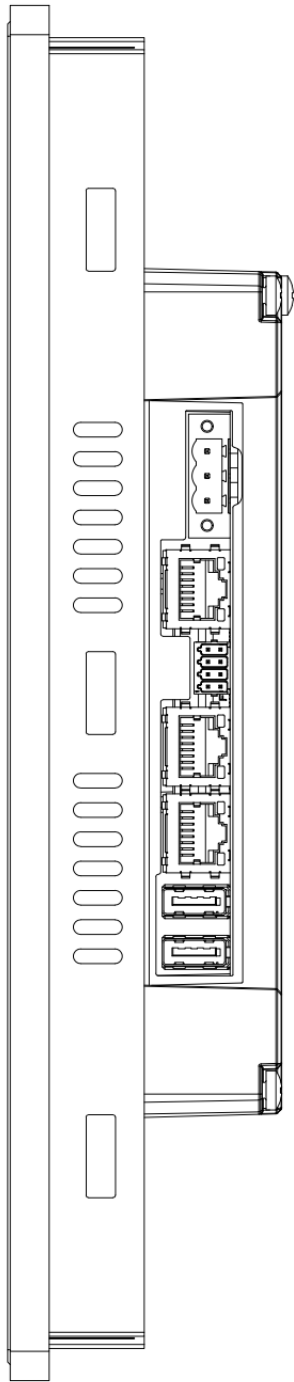


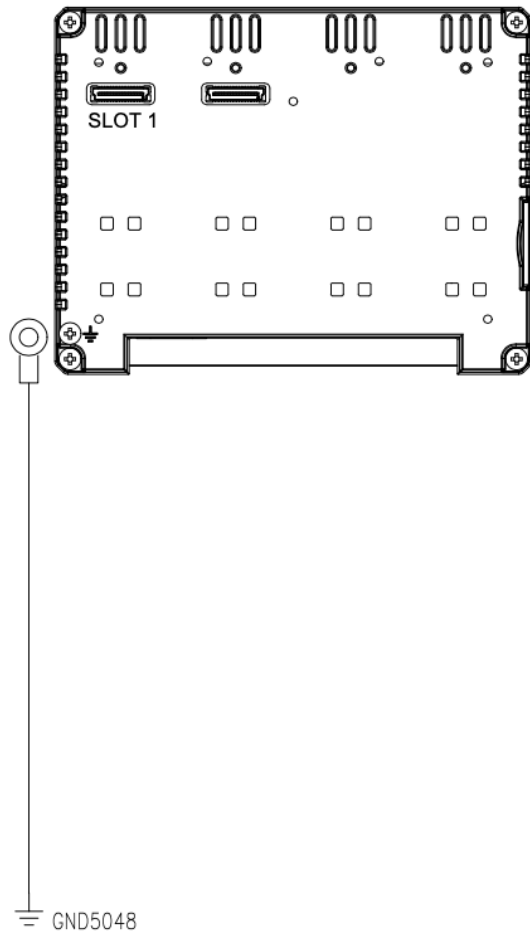
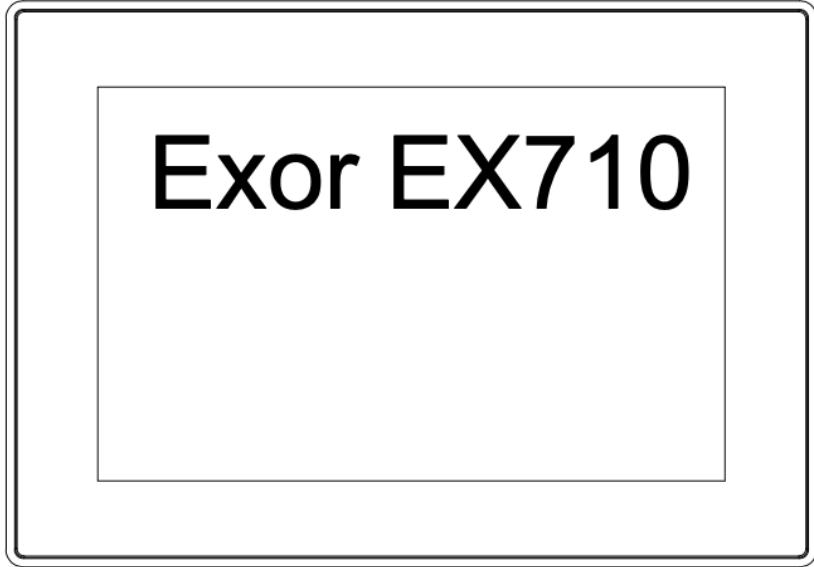
NOTE: OPTIONAL FLOW METER OPTIONS
 SCM101 - GEAR METER WITH INTRINSICALLY SAFE BARRIER
 SCM102 - GEAR METER WITH FIBER OPTIC
 SCM103 - CORIOLIS FLOW METER
 SCM104 - CORIOLIS FLOW METER WITH INTRINSICALLY SAFE BARRIER
 SCM105 - CORIOLIS FLOW METER WITH FIBER OPTIC
 SCM106 - PISTON METER
 SCM107 - PISTON METER WITH INTRINSICALLY SAFE BARRIER

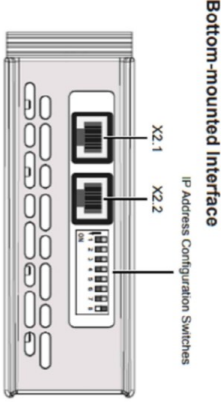
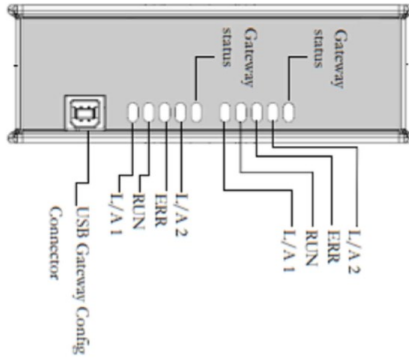
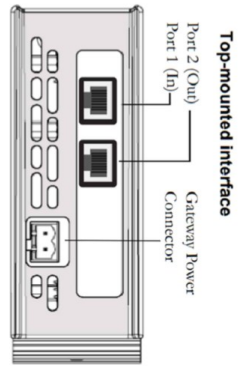


EK1100
EL2502
EL1808
EL2809
EL2809
EL3174
EL5152

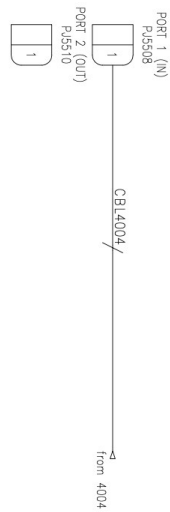
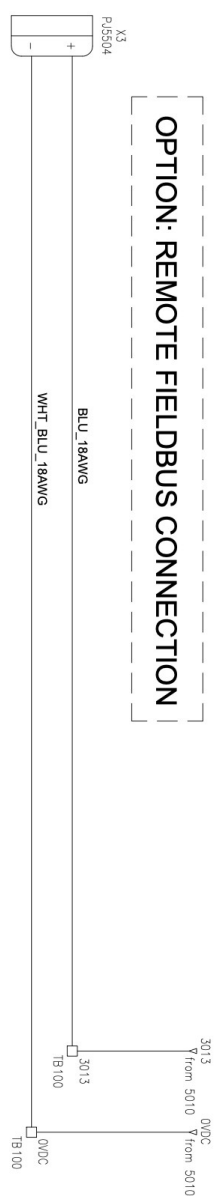








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OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	192.168.0.2
ON	ON	ON	ON	ON	ON	ON	OFF	192.168.0.254
ON	ON	ON	ON	ON	ON	ON	ON	(Not valid)



MANUAL CHANGE SUMMARY

XX/XX/XXXX 1st Draft

WARRANTY POLICY

This product is covered by Carlisle Fluid Technologies' materials and workmanship limited warranty. The use of any parts or accessories, from a source other than Carlisle Fluid Technologies, will void all warranties. Failure to reasonably follow any maintenance guidance provided, may invalidate any warranty.

For specific warranty information please contact Carlisle Fluid Technologies.

For technical assistance or to locate an authorized distributor, contact one of our international sales and customer support locations.

Region	Industrial / Automotive	Automotive Refinishing
Americas	Tel: 1-800-992-4657 Fax: 1-888-246-5732	Tel: 1-800-445-3988 Fax: 1-800-445-6643
Europe, Africa Middle East, India		Tel: +44 (0)1202 571 111 Fax: +44 (0)1202 573 488
China		Tel: +8621-3373 0108 Fax: +8621-3373 0308
Japan		Tel: +81 45 785 6421 Fax: +81 45 785 6517
Australia		Tel: +61 (0) 2 8525 7555 Fax: +61 (0) 2 8525 7575

For the latest information about our products, visit www.carlisleleft.com

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